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NESTING IN WESTERN INDIA.

(*Continued from p.* 98.)

342.—THE MALABAR WHISTLING THRUSH.

Myiophoneus horsfieldi, Vig.

The Malabar Whistling Thrush, or Idle Schoolboy, is not uncommon on the Ghâts, confining itself to the wooded ravines and nullahs on the hill sides. It occurs but very rarely at Aboo. It is a permanent resident, commencing to breed about June; the nest, which is a very large one, is generally found close to water;* it is composed of fine sticks, roots, grass, moss, &c., having a good deal of earth mixed with it, especially at the bottom.

The eggs, four in number, are broad ovals, slightly pinched in at one end, measuring 1·22 inches in length, by about 0·95 in breadth. In colour they are pinkish- or greyish-white, thickly speckled and spotted with pinkish-brown.

They breed very commonly at Poorundhur, near Poona, where they are known as Hill Blue Birds.

Khandalla, 5th June. — *H. E. Barnes.*
Saptashring, Nassick, July. — *J. Davidson, C.S.*

345.—THE YELLOW-BREASTED GROUND THRUSH.

Pitta brachyura, Linn.

The Indian or Yellow-breasted Ground Thrush has not been recorded from Sind; it occurs sparingly at and around Deesa, but

* Mr. Davidson, C.S., has often found them in the faces of tremendous cliffs.

becomes more common further south and east. In most of these places it occurs merely as a passing visitor, but some few remain to breed at suitable places on the Ghâts; the nest is a clumsy-looking structure, with an entrance on one side, composed of dead leaves, grass, and fine twigs, lined with finer grass and leaves.

It is usually placed in a bush or low tree, occasionally on the ground; the eggs, four or five in number, are broad oval in shape, measuring an inch in length by rather more than 0·85 in breadth; in colour they are a beautiful glossy china-white, with deep maroon and purplish spots, streaks, and hair lines, denser towards the larger end, where they often form a zone or cap; occasionally the lines are absent, and the egg is merely speckled finely at the larger end with maroon and pale lilac.

Khondabhari Ghât, Khandesh, July.	*J. Davidson, C.S.*
Dangs, Nassick, June.	*Do.*
Coast, Kanara, June.	*Do.*
Khandalla, June (nest only).	*H. E. Barnes.*
Saugor, C. P., July.	*Do.*

354.—THE WHITE-WINGED GROUND THRUSH.

Geocichla cyanotis, Jard.

The White-winged Ground Thrush is a permanent resident all along the Sahyadri Range, common in the south, but becoming much less so further north. It breeds early in the rains, making a cup-shaped nest of grass-roots and twigs, with which a great deal of earth is incorporated; it is usually placed in a fork in a tree, at no great height from the ground. The eggs, three or four in number, vary a good deal both in size and colour. The usual type has a very pale green ground colour, spotted and speckled with various shades of reddish-brown; occasionally the ground colour is pale olive-green and sometimes of a pale fawn. They measure one inch in length by nearly 0·72 in breadth.

Khandalla, June.	*H. E Barnes.*
Khondabhari Ghât, Khandesh, July & August.	*J. Davidson, C.S.*
Dangs, Nassick, June.	*Do.*

359.—THE BLACK-CAPPED BLACKBIRD.

Merula nigropilea, Lafr.

The Blackbird does not occur in Sind, is rare at Mount Aboo, and in Khandesh occurs only as a straggler, but in the Ghât parts

of Nassick, (elsewhere unknown) during the rains, it is very common. Mr. Davidson is of opinion that they arrive in the latter district about the beginning of May, and leave at the end of the rains, after breeding, some few birds remaining later. In Ratnagiri it appears to be a fairly common permanent resident. They breed during the rains, on trees and bushes, at all heights from the ground, from four to twenty feet. The nests, composed of green moss and twigs, are of the usual blackbird type, and are large and rather clumsy. The eggs, three or four in number, (generally three), are oval in shape, pinched in at one end, measuring 1·1 inches in length by about 0·9 in breadth; in colour they are greenish-white, boldly blotched with various shades of bright reddish-brown, with an occasional underlying cloud of faint inky-purple. The markings are usually most dense at the larger end, where they often form an irregular cap. Some of them resemble eggs of the Missel Thrush.

Mr. Davidson, C.S., obtained a great number of eggs from Saptashring, Nassick. I found a half-finished nest at Aboo in June, but had to leave the hill before the eggs were laid, and a nest containing three slightly incubated eggs at Khandalla in July. I have received the eggs from the Pachmari Hills, in the Central Provinces.

Saptashring & Ghâts, Nassick, June & July. *J. Davidson, C. S.*
Khandalla, July. *H. E. Barnes.*
Aboo (nest only) June. *Do.*

385.—THE YELLOW-EYED BABBLER.

Pyctoris sinensis, Gm.

The Yellow-eyed Babbler occurs more or less commonly throughout Western India, breeding during the rains, making typically a solid, compact, cone-shaped nest (often broadly truncated), with the apex downwards. It is composed of broad blades of grass, neatly lined with fine grass roots and stems, coated on the exterior with spider webs.

It is usually placed in a slender fork in a small tree or bush, sometimes between the upright stems of reeds, &c. I have never found the nest on a Banyan tree, as stated by Jerdon, on the authority of Mr. Phillips.

The eggs, four or five in number, vary much in colour; one type (the commonest) has the ground colour a delicate pinkish-white, thickly freckled with specks of brick-red; another, the same

colour, but with the ground markings consisting of blotches and streaks of bright blood- and brick-red boldly defined, and having an occasional underlying cloud of pale inky-purple. Sometimes the ground colour is nearly white; between these extremes every possible combination occurs.

It may have been a mere coincidence, but all the eggs I took in Sind (and I took a great number) were of the first mentioned type.

The eggs are broad oval in shape, and average 0·73 inches in length by about 0·59 in breadth. They have a high gloss.

386*ter*.—THE GREY-THROATED BABBLER.

Pyctoris griseogularis, Hume.

The Grey-throated Babbler is said to be a permanent resident in Sind, but I am not aware of the nest having been taken.

389.—THE NILGIRI QUAKER THRUSH.

Alcippe poiocephala, Jerd.

Mr. Davidson, who has afforded me much valuable assistance in compiling this paper, has furnished me with this and the following note:—

"This bird is very common at Matheran, and all through the Ghâts, from the south of Kanara to the extreme north, where they end in Khandesh. It builds a neat nest, somewhat of the bulbul type, and generally conceals it among some thick branches, a favourite place being among some climbing plant which has twisted itself among the branches of a thick tree. The nest is generally about ten to fifteen feet from the ground, but is sometimes within reach. The eggs, three in number, are very beautiful."

In shape they are moderately broad ovals, somewhat compressed at one end, and have a fine and rather glossy shell. The ground colour is a delicate pink. There are a few pretty large and conspicuous spots and hair lines of deep brownish-red, almost black, and there are a few large pinkish-brown smears and clouds, generally lying around or about the dark spots; and then towards the large end there are several small clouds and patches of faint inky purple, which appear to underlie the other markings.—(*Nests and Eggs of Indian Birds, p.* 241.) As is usually the case with highly-coloured eggs, they are subject to much variation in colour and markings

some taken by Mr. W. Davison are described as being of a beautiful reddish-pink, blotched and streaked with reddish carmine.

390.—THE BLACK-HEADED QUAKER THRUSH.

Alcippe atriceps, Jerd.

"This brisk little bird is very common in the jungles of Kanara from the sea-level to the full height of the Ghâts and also in the jungles above, wherever there is any bamboo jungle. They go about in small parties or pairs, and seem in a chronic state of building nests. Indeed, I have watched the birds building frequently during the hot weather and early rains. I do not think the nests are for incubation as a rule, but that after the nesting season is over, the family always roost in a nest. For some reason or another they soon get tired of their nest, and six or seven are generally to be found close to one another. They are large masses of bamboo leaves with (in the cases of new ones) a hollow inside lined with fine grass; generally (but not always) opening from the top.

"The only nest I have taken with eggs was in the middle of June at Karwar, but an egg undoubtedly of this bird was brought me in April from the crest of the Ghâts. The eggs are large for so small a bird, and are of a pale pinkish-white colour, boldly spotted at the larger end with deep brick-red. There were two fresh eggs in the nest I found."

397.—THE RUFOUS-BELLIED BABBLER.

Dumetia hyperythra, Frankl.

This little Babbler has been recorded from the Konkan and Khandesh, and from the Vindhian Hills, near Mhow. Mr. Wenden found them breeding at Tanna and at Khandalla during the rains; the nest is globular in shape, composed of coarse grass blades, sparingly lined with fine grass. It is frequently placed on the ground amongst coarse grass, or dead leaves, with which it is not infrequently incorporated; occasionally it is found in low scrub bushes only a foot or so from the ground.

The eggs, four in number, are broad oval in shape, white in colour, spotted, speckled, streaked and blotched with brownish-red and reddish-purple; the markings are sometimes clearly defined, at others they are smudgy, in others again they are speckly. They measure 0·67 inches in length by about 0·53 in breadth.

The birds are very common at Saugor, breeding during July and August.

398.—THE WHITE-THROATED WREN BABBLER.

Dumetia albogularis, Blyth.

The White-throated Wren Babbler is much more generally distributed in Western India than I once thought. It occurs all along the Sahyadri Range, is not uncommon at Mount Aboo, is fairly common at and in the vicinity of Baroda, and I myself have found it breeding on the slopes, under the cliffs, at Sion, near Bombay.

It is a permanent resident at all these places, and breeds at the end of the hot weather and during the early part of the monsoon.

The nest is globular in shape, having the entrance near the top, and is composed of broad leaved grasses and sedges, and is placed on the ground, occasionally in low bushes.

The eggs, usually four in number, are oval in shape, pinched in a little at one end, and measure 0·73 inches in length by about 0·51 in breadth. The ground colour is china-white (sometimes pinkish white), freckled and spotted with bright red; the markings are usually much denser at the larger end, where they often form a cap or zone, and having an occasional spot of lilac or clayey-brown intermingled.

Mr. Davidson, C.S., took a nest towards the end of May, containing seven eggs, but as they belonged to two distinct types, and as he, after waiting a short time, saw three birds flitting towards the nest, they were possibly the joint produce of two females.

Sion, near Bombay, 10th May.	*H. E. Barnes.*
Baroda, July and August.	*H. Littledale, B.A.*
Dangs & Hills in Nassick, June & July.	*J. Davidson, C.S.*
Khondabhari Ghát, Khandesh, July & August.	*Do.*
Dhulia, Khandesh, April.	*Do.*

399.—THE SPOTTED WREN BABBLER.

Pellorneum ruficeps, Sws.

I have never met with this bird in the flesh, and am indebted to Mr. J. Davidson for the following note:—"This bird is common in the Kanara jungles, and I have noticed it through all the hill parts of Nassick. It is, however, about the shyest bird in the jungle, and is often overlooked. It breeds in April and May in Kanara, making its nest on the ground, in thick evergreen jungle, where there is no grass. The nest is a large ball of leaves with the entrance at the side. The number of eggs I have found have always been

either two or three, and I have found two eggs, hard set. They are in some respects not unlike a common type of *Thamnobia fulicata*, being greyish-white thickly mottled with numerous very fine spots of various shades of brownish-purple.

404.—THE SOUTHERN SCIMITAR BABBLER.

Pomatorhinus horsfieldi, Sykes.

As its trivial name implies, this Babbler only occurs in the southern portion of the Presidency on the slopes and at the foot of the Sahyadri Range, where it is stated to be a permanent resident. I can find no authentic record of its nest having been taken within our limits,* but elsewhere they breed from April to May, making a large globular nest of roots, grass, and moss, the moss being principally used as a lining; it is placed on or near the ground, under the shelter afforded by a clump of grass or bush. The eggs, three or five in number, are somewhat elongated ovals in shape, and are smooth spotless white in colour; they measure 1·08 inches in length by about 0·77 in breadth.

404*ter*.—HUME'S SCIMITAR BABBLER.

Pomatorhinus obscurus, Hume.

The differences between this bird and the Southern Scimitar Babbler are slight, and it requires a careful examination to distinguish them from one another. It is very common on Mount Aboo and on the hills in the neighbourhood, and specimens sent to Mr. Hume from the borders of Khandesh and Nassick, as *horsfieldi*, by Mr. Davidson, were identified by the former as this bird. Personally he doubts their distinctness, as also do I. He has taken nests on the Ghâts bordering between Khandesh and Nassick in April. The number of eggs in all cases was two, and the nests seemed to him to be slighter built than the rough nest he has seen of *horsfieldi*.

No Scimitar Babbler of any kind has as yet been recorded from Sind.

I found a nest at Mt. Aboo in the middle of June, nearly completed, but had unfortunately to leave before the eggs were laid.

It was a loose ball of coarse grass, and was placed under a clump of ferns.

* Since the above was written, Mr. Davidson has informed me that he took a nest in the Varna valley, Satara, in April, containing two fresh eggs.

432.—THE BENGAL BABBLER.

Malacocercus terricolor, Hodgs.

The Bengal Babbler is very common in Sind, and occurs not uncommonly in Guzerat, but becomes rarer further south, where it is replaced by the closely allied Jungle Babbler (*Malacocercus malabaricus*). They are permanent residents where found, breeding from March to July, but occasionally nests are found at other seasons (I took a nest containing four eggs in January); the nests are cup-shaped, and are, as a rule, loosely constructed, but now and then a more carefully-made nest is met with. They are often found in gardens, placed in forks in fruit-trees, bushes, thick hedges, vineries, &c. They are composed of grass-roots and stems; the eggs, three or four in number, are broadish oval in shape, but are subject to considerable variation; they measure about an inch in length by 0·78 in breadth; they are of a beautiful greenish-blue colour, and are generally highly glossy.

433.—THE WHITE-HEADED BABBLER.

Malacocercus griseus, Lath.

The White-headed Babbler occurs not uncommonly at and near Belgaum, and is common all along the Kanara Coast, and above the Ghâts wherever the country is at all open, but does not appear to come much further north. They breed twice a year, from April to June, and again in October and November; the nest, cup-shaped, is composed of fine twigs, grass stems and roots, and is loosely made; it is usually placed in the centre of some small tree or bush; the eggs, three or four in number, are of a deep glossy greenish-blue, quite unspotted. Those in my collection are much deeper in colour than any other Babbler's egg that I am acquainted with, and although taken many years ago, are still as bright and glossy as at first; they have not, of course, been exposed to the light. Mr. Davidson says: "Eggs of this Babbler I took in Mysore were the palest Babbler's I have ever taken, and others I have taken in Kanara are as deep as *malabaricus*."

They measure 0·98 inches in length by about 0·7 in breadth.

Kanara, March & April. *J. Davidson, C.S.*

434.—THE JUNGLE BABBLER.

Malacocercus malabaricus, Jerd.

The Jungle Babbler takes the place of the Bengal Babbler in the southern portion of the Western Presidency.

It is very irregular in its breeding habits (but this trait seems common to the genus); nests have been taken from April to October, and occasionally earlier. Both eggs and nests are absolutely identical with those of the Bengal Babbler, *Malacocercus terricolor*.

Mr. Davidson says: "I have taken nests in all the jungle parts of Khandesh (Satpooras and Ghâts) and in all jungle parts of Nassick, and in Kanara."

435.—THE RUFOUS-TAILED BABBLER.

Malacocercus somervillei, Sykes.

The Rufous-tailed Babbler is much more extensively distributed than is usually thought; Mr. Hume says it is confined to a narrow strip of country, sixty miles north and south of Bombay, but it occurs very much further south than this, and is the common Babbler of the Ratnagiri district.

They breed from June to August, much in the same way as the other Babblers. The eggs, three or four in number, are uniform deep greenish-blue, and in size and shape resemble those of the Bengal Babbler.

Dadur & Sion, near Bombay, June & July. *H. E. Barnes.*

436.—THE LARGE GREY BABBLER.

Argya malcolmi, Sykes.

The Large Grey Babbler is common in the Deccan, fairly common in Rajputana and Guzerat, is very rare in Sind, and appears to be altogether absent from Ratnagiri and the more southern portions of Western India.

They breed more or less the whole year through, but May to July is the season when most nests will be found. The nest, which is a loose cup-shaped structure, composed of fine twigs and grass roots, is generally placed in a fork in a small tree, a babool by preference, at no very great height from the ground. The eggs, three or four in number, are not distinguishable from those of the Bengal Babbler; nests are often found in the trees that border the sides of the roads.

437.—THE RUFOUS BABBLER.

Layardia subrufa, Jerd.

This is another bird concerning the breeding of which little or nothing seems to be known. Mr. Davidson found it to be a permanent resident in the Kanara forests, not at all common and very local. He has never seen its nest.

438.—THE STRIATED BUSH BABBLER.

Chatarrhæa caudata, Dum.

Except in Ratnagiri and the more southern portion of the Presidency, the Striated Bush Babbler is extremely common, breeding more or less the whole year round, making a deep, cup-shaped nest, much more neatly and compactly built than that of any other Babbler I am acquainted with.

It is composed of grass roots and stems, occasionally unlined, but usually well lined with fine grass and hair. The nest is placed in the centre of some low thorny bush, such as a stunted babool.

In Sind, the wild caper bushes that are so common on the hillocks and ridges of wind-blown sand, are generally selected, but even here the babool bushes have their share of nests. The eggs, three or four in number, are longish ovals in shape, and in colour are bright spotless blue or greenish blue. They measure 0·84 inches in length by about 0·63 in breadth.

439.—THE STRIATED REED BABBLER.

Chatarrhæa earlii, Blyth.

Within our limits the Striated Reed Babbler only occurs in suitable places in Sind, where it is a permanent resident, breeding from March to September, and having at least two broods in the year. The nest, which is rather massive and cup-shaped, is composed of broad grass leaves and roots, and is placed in close-growing reeds or low bushes. The eggs, three or four in number, are bright bluish green in colour, and in shape are longish ovals, somewhat pinched in at one end. They measure 0·96 inches in length by about 0·73 in breadth.

Hyderabad, Sind, March to September. *H. E. Barnes.*

Eastern Narra, Sind, March to October. *S. B. Doig, Esq.*

440.—THE STRIATED MARSH BABBLER.

Megalurus palustris, Hors.

Mr. Davidson found this bird in the islands in the Taptee in Khandesh, from November to May, and is certain it bred there. Whether it stayed or not during the rains he does not know; he never found a nest.

Elsewhere they breed during May and June, making a somewhat globular nest with the entrance near the top; it is composed entirely of coarse grass, and is placed in a dense cluster of reeds or grass.

An egg in my collection measures 0·9 inches in length by 0·63 in breadth.

The ground is a dull dead white, thickly speckled and spotted with purplish- and blackish-brown.

441.—THE GRASS BABBLER.

Chœtornis striatus, Jerd.

The Grass Babbler is not uncommon in Northern Gujerat and in some parts of Central India. It breeds during the rains, making a roundish nest having the entrance hole near the top. It is composed of dry grass, and is placed on the ground in the centre of a low bush.

The eggs, four in number, are white in colour, speckled all over with reddish-brown and pale lavender. These spots are much more dense at the larger end, where they form a cap.

They much resemble eggs of *Franklinia buchanani*, but are much larger, equalling those of the Striated Bush Babbler.

Deesa, 18th August. *Capt Butler.*

Deesa, 4th September (nestlings). *H. E. Barnes.*

442.—THE BROAD-TAILED REED-BIRD.

Schœnicola platyurus, Jerd.

The Broad-tailed Reed-Bird is very rare. Capt. Butler found it breeding in September at Belgaum. The nests were in long grass by the side of rice fields, but unfortunately he does not describe either the nests or eggs.

443.—THE LONG-TAILED REED-BIRD.

Laticilla burnesi, Blyth.

The Long-tailed Reed-Bird is very numerous in the Eastern Narra District and some other suitable places in Sind, but has not been recorded from any other part of the Western Presidency.

Mr. Doig appears to be the only oologist who has as yet taken the eggs.

He found them breeding in March, June, and September, and describes the nest as being composed of coarse grass lined with fine grass and roots, and measuring four to five inches in diameter externally and two and a half internally, the egg cavity being one and a half inches deep. The nest is placed in the centre of a tussock of grass. The usual number of eggs is three, and they average 0·72

inches in length by about 0·54 in breadth. In colour the eggs vary a great deal, there being two distinct types, one resembling some eggs of the Yellow-throated Sparrow (*Gymnoris flavicollis*), having the ground colour of a pale green covered with large irregular blotches of purplish-brown, and the other having the ground colour very pale cream, with large rusty blotches, which are most numerous at the large end. They desert the nest on the slightest provocation, even after the eggs are laid.

The eggs in my collection, which I owe to the kindness of Mr. Doig, belong to the first-mentioned type.

446.—THE GHÂT BLACK BULBUL.

Hypsipetes ganesa, Sykes.

The Ghât Black Bulbul is stated to occur sparingly on the Sahyadri Range, only as far north as Mahableshwar, but I have received the nest and eggs from Matheran, taken in June, and am almost certain that I saw a bird at Khandalla in July. The nest was placed against the side of a stout branch, just where a few thin twigs jutted out, and these formed a support to the nest, some of them being incorporated with it. The nest appears small for the size of the bird, the egg cavity measuring about two and three quarters inches in diameter by about one and a half deep.

The nest is composed principally of moss, well lined with fine grass and moss roots.

The eggs are oval in shape, pinched in a little at one end, and measure rather more than an inch in length by about three-quarters in breadth; they are of a pale pinkish-white stone colour, profusely spotted and speckled with claret and purplish-red, and having a few underlying spots of pale inky-purple.

Mr. Davidson found it common in the Kanara jungles, principally on and above the Ghâts.

Kanara, April and May. *J. Davidson, C.S.*

450.—THE YELLOW-BROWED BULBUL.

Criniger ictericus, Sw.

Mr. Davidson has kindly furnished me with the following interesting note:—

"This is a very common bird in all the Kanara jungles wherever the jungle is evergreen. It builds a slight nest on a thin branch of a low sapling. This is fastened by the sides to a fork like an oriole's, and is composed outwardly of rope-like fibre, with a dead

leaf or two laid on it, and lined internally with fine grass cut into short pieces. The edge has a slight coating of spider and red ant webs.

"All the nests I have seen have been from eight to fifteen feet from the ground, and none have contained more than three eggs or young (generally two). The eggs are long shaped, of a pinkish-white, faintly blotched at the large end with close blotches of a pink slightly deeper than the ground colour. Some are exactly similar in colour to those of (*Myagra azurea*), the Black-naped Blue Fly-catcher.

452.—THE WHITE-BROWED BULBUL.

Ixus luteolus, Less.

The White-browed Bush Bulbul is common about Bombay, but appears to avoid the Ghâts. They are permanent residents, breeding during the rains. Mr. Davidson found them common along the Kanara Coast, breeding like most of the Bulbuls occasionally at almost all seasons.

The nest, composed of thin twigs, is lined with fine grass stems, and is suspended between the twigs forming a fork, in a low bush or tree, and is generally overshadowed by another bough.

The eggs, three in number, are oval in shape, measuring 0·94 inches in length by 0·62 in breadth. In colour they are pinkish-white, thickly spotted and blotched with claret and purplish-red. These markings are much more profuse at the larger end.

Mt. Sion (near Bombay), July & August *H. E. Barnes.*

455.—THE RUBY-THROATED BULBUL.

Rubigula gularis, Gould.

Mr. Davidson informs me that the Ruby-throated Bulbul is rather a common bird in the Kanara forests both on the coast and above the ghâts. Neat nests of the bulbul type in low bushes have been pointed out to him as belonging to this bird, but though a permanent resident he has never taken the eggs.

457.—THE GREY-HEADED BULBUL.

Brachypodius poiocephalus, Jerd.

Mr. Davidson found the Grey-headed Bulbul to be not uncommon in the Kanara forests above the ghâts, where he has no donbt it is a permanent resident, but he knows nothing of its breeding habits.

459.—THE WHITE-EARED CRESTED BULBUL.

Otocompsa leucotis, Gould.

The White-eared Crested Bulbul is the common bulbul of Sind, and occurs not uncommonly in Northern Guzerat. They breed from April to August; the nests are usually placed in dense tamarisk bushes (occasionally in small babool trees), at heights varying from three to six feet from the ground; they are cup-shaped, slenderly but firmly built, and bear handling well; they are composed of fine twigs of tamarisk, &c., grass roots and vegetable fibre, and are unlined.

The eggs, three in number, very rarely four, are longish ovals in shape, pointed at one end, and are reddish-white in colour, spotted, streaked, and blotched with brownish- and purplish-red. They measure 0·82 inches in length by 0·64 in breadth.

Hyderabad, Sind, April to August. *H. E. Barnes.*

460*bis*.—THE SOUTHERN RED-WHISKERED BULBUL.

Otocompsa fuscicaudata, Gould.

The Southern Red-whiskered Bulbul is common all along the Sahyadri range and forests adjacent; it is also very common at Mount Aboo.

It is equally common in the vicinity of Bombay.

They breed from March to June, making a deep cup-shaped nest composed of grass roots, with a quantity of dead leaves or dried ferns worked into the bottom, and lined with fine grass and the hair-like roots and stems of ferns.

They are often bound on the exterior with spider webs.

The eggs, two or three in number, are reddish-white in colour, thickly streaked, spotted, and speckled with rich blood- and brick-red, with a few scarcely visible spots of pale inky-purple.

They measure 0·9 inches in length by about 0·66 in breadth.

Mt. Sion (near Bombay), March to May. *H. E. Barnes.*
Khandalla, June and July. *Do.*
Aboo, May and June. *Do.*
Nassick Ghats, Feb. to July. *J. Davidson, C. S.*
Kanara forests, Feb. to May *Do.*

462.—THE COMMON MADRAS BULBUL.

Pycnonotus hæmorrhous, Gm.

The Common Madras Bulbul is very abundant throughout the Western Presidency, except in Upper Sind, where it is very rare.

They breed from April to October, rearing at least two broods in the year. The nest is generally built on a low bush or fruit tree, rarely at any great height from the ground. It is neatly but lightly made, cup-shaped, and is composed of grass stems, lined with finer grass, and occasionally with hair. The eggs, three or four in number, are rather longish ovals in shape, pinkish-white in colour, speckled, blotched, streaked and clouded with claret and purplish-red. The markings are liable to excessive variation. They measure 0·9 inches in length by 0·68 in breadth.

Lately at Sangor, C. P., I have found many nests, rather high up, in forks of medium-sized babool trees.

463.—THE COMMON GREEN BULBUL.

Phyllornis jerdoni, Blyth.

I have never found a nest of the Common Green Bulbul, although it occurs more or less commonly (with the exception of Sind) throughout the Presidency.

Mr. Davidson, who has been more successful, has kindly furnished me with the following note :—

"This bird is very common on the Nassick ghâts, about Egutpura, and is found in all the wooded districts of this Presidency. It conceals its nest in a thick tree, such as a mango or mowa, so that it is in many cases quite impossible to discover it by merely examining the tree from below. The nest, a neat cup, is suspended from the side of a fork or succession of twigs. I have found it only at heights from twelve to twenty feet from the ground. The eggs are very long shaped, and all white, with small blotches of very dark purple sparingly scattered over them. I have always found either two or three eggs."

Khondabhari Ghat, Khandesh, Aug. — *J. Davidson, C.S.*

Nassick districts, Feb. — *Do.*

464.—THE MALABAR GREEN BULBUL.

Phyllornis malabaricus, Gm.

I can find nothing on record regarding the breeding of this bird, although it appears to be a permanent resident where it occurs.

468.—WHITE-WINGED GREEN BULBUL

OR

THE WHITE-WINGED IORA.

Iora tiphia, Lin.

The White-winged Iora is altogether absent from Sind, and is replaced in Northern Gujerat by the next species. It appears to be common in the Southern and Eastern portions of Western India, and occurs not uncommonly on Mount Aboo.

It is of course a permanent resident, breeding from the commencement of the rains until near the end. The nest, a deepish cup, is usually placed on a horizontal bough, generally at a place where a few upright twigs spring out from the bough helping to keep it securely in position; occasionally the nest is placed in an upright fork composed of three or four twigs, and in this case the nest is generally deeper.

It is composed of vegetable fibres, lined with fine grass and hairs, and is thickly coated on the outside with spider webs.

It is firmly and compactly made, but the walls are thin, often not more than three-sixteenths of an inch in thickness; the bottom, too, when the nest is placed on a horizontal bough, is very thin, often not more than one-eighth of an inch, but when it is placed in an upright fork, the bottom is continued to a blunt point, and is then often an inch or even more in thickness.

The nest a good deal resembles that of the White-browed Fantail Flycatcher, but is rather more loosely made and is not quite so compact.

The eggs, two or three in number, are moderately broad ovals in shape, a little pointed at one end; the ground colour is greyish-, yellowish-, or creamy-white, having longitudinal streak of purplish-reddish- or yellowish-brown. These streaks start from the larger end, where they often form an imperfect cap or belt, often leaving the smaller end comparatively clear. They average about 0·69 inches in length by rather more than 0·54 in breadth.

Neemuch, July and August. *H. E. Barnes.*
Baroda, June to October *H. Littledale.*

468*bis*—THE WESTERN IORA.

Iora nigrolutea, Mar.

This is the Common Iora of Guzerat, and occurs most abundantly

in the vicinity of Deesa, where alone I have had an opportunity of observing; it is equally abundant with *tiphia* in West Khandesh, and appears to straggle a good deal; it breeds about the same time and in the same manner as the Common Iora, but the only eggs I have seen had the ground colour almost pure white, and the markings were two shades of purplish-brown; but I have no doubt, if a sufficiently large series were examined, no constant difference would be detected.

Deesa, June and July. *H. E. Barnes.*
Dhulia, Khandesh, July *J. Davidson, C.S.*

469.—THE FAIRY BLUE BIRD.

Irene puella, Lath.

I have never had an opportunity of examining this bird in life, and am indebted to Mr. Davidson, C.S., for the following interesting note, which I reproduce *in extenso*:—

"This, about the loveliest bird in the Bombay Presidency, is a fairly common bird through the forests of Kanara, and I have often seen five or six pairs in a morning's walk. The nests are, however, very difficult to find. The first I obtained was in the end of March, and contained two half-grown young. It was close to a river and a road. The nest was about twenty feet from the ground, in a thin tree, and was visible from any distance; it was a clumsy structure of twigs, lined with fine roots, very much like the lining on *Volvocivora sykesi*, and there was a little moss round the outside.

Another nest taken in the end of April was on a pollarded tree, about fifteen feet from the ground; it contained two fresh eggs, and the nest was more neatly made, the twigs being bound round outwardly with green moss. The egg or eggs (for one was broken before it reached my hands) was of an olive-green colour, blotched with brownish-olive. It somewhat resembled the egg of (*Eudynamis honorata*) the Common Koel, but was a good deal narrower.

470.—THE INDIAN ORIOLE

Oriolus kundoo, Sykes.

The Indian Oriole occurs pretty generally throughout Western India, but is decidedly uncommon in Sind, and appears to be replaced on the higher ranges of hills by the Black-headed Oriole.

They are permanent * residents, breeding during May and June.

* Mr. Davidson, C.S, says:—"A migrant as far as I can judge in Kanara, all leaving the district in May.

The nest is a deep purse-like cup, carefully suspended between two twigs forming a fork, to which it is firmly attached by strips of bark, grass, and, occasionally, even bits of cloth.

It is strongly and compactly made, and is well lined with fine grass. From below the nest looks very small, and is usually partially hidden by foliage, above it must be invisible, although placed rather high up, and almost at the extremity of a bough.

The eggs, three in number, occasionally four, are moderately long-ish ovals in shape, pinched in a good deal at one end, but other forms are not uncommon; they are of a glossy china-white colour, thinly sprinkled at the larger end with spots and specks of blackish-brown, mostly confined to the larger end; these markings are sometimes almost entirely black, but occasionally they are reddish-, or even yellowish-brown, but this last type is very uncommon.

They vary a great deal in size, but the average is rather more than 1·1 inch in length by about 0·8 in breadth. The eggs forming a clutch often differ considerably both in size and shape.

As soon as the eggs are laid, the birds seem to lay aside their usual timorous disposition, and boldly attack any bird that ventures near the nest; this habit often leads to its discovery. If nestlings are found within a reasonable distance, say a mile or so, and are placed in a cage, in a position accessible to the parent birds, they will attend and feed them, until long after they are able to fly and feed themselves; but as a rule, when the old birds cease to visit them, they refuse food, pine away and die.

471.—THE BLACK-NAPED INDIAN ORIOLE.

Oriolus indicus, Jerd.

Occurs very rarely in Kanara; I know nothing of its breeding.

472.—THE BLACK-HEADED ORIOLE.

Oriolus melanocephalus, Lin.

I have never met with a nest of the Black-headed Oriole. Mr. Davidson, C.S., has kindly furnished the following note:—

"This bird is common throughout the ghâts from Khandesh down to Egutpoora, inhabiting all the warm valleys.

"It is also very common all the year in the Kanara jungles below the ghâts, but leaves the part above the ghâts, at all events, to a great extent in May.

"It builds a very compact nest of bamboo leaves and grass, lined with fine roots, and is suspended between two twigs forming a fork generally about fifteen feet from the ground.

The number of eggs is three, and they vary a good deal. They are generally of a light salmon colour, with bold blotches of dark lilac-brown scattered over the broader end. They are fairly glossy, many resemble much some types of (*Buchanga atra*) the Common King Crow, but are larger and more glossy." They average 1·14 inches in length by about 0·82 in breadth.

Nassick Ghâts, May to July. — *J. Davidson, C.S.*

Khondabhari Ghats, Khandesh, July. — *Do.*

THE MAN-EATING TIGRESS OF MUNDA'LI.

Since Mr. Reginald Gilbert read a paper on Man-Eating Tigers, before the Members of the Society, on 4th September 1889, the subject has been freely discussed, and we are consequently glad to reprint the following account of the destruction of a veritable Man-Eating Tigress, which appeared in the *Indian Forester* for July 1889 (Vol. XV., No. 7):—

"Our readers will forgive us for being so late in the day with our account of this brute, which had been for more than 12 years the scourge of the hills immediately north of Chakrata. The present paper was, however, already in print before our June Number issued from the press, and it was only want of space that prevented its publication in that Number.

"According to the information we have been able to collect, our tigress seems to have been first heard of in 1876. Throughout her career as a man-eater, she confined herself to a narrow beat hardly 24 miles from end to end, ranging from the Rama Sarai group of villages in the Jumna Valley to the spur immediately overlooking Chakrata.

"After leaving the Jumna Valley she came up to Lokhár at the top of the spur just above Rama Sarái. From Lokhár she followed up, to the other end of her beat, the main ridge which forms the water-parting between the Jumna and Tons rivers. She never left this ridge or its vicinity to go down to the numerous villages which skirt the valleys of the several mountain streams that run down into the

Tons. This ridge, being from 8,000 to 10,000 feet above the sea, is covered with snow from December to the end of March, so that during the winter she remained at the lower elevations round Ráma Saráí. But so soon as the snows were melted, she would come up again, although during April-May and October-November the temperature on the ridge after sundown stands constantly in the vicinity of freezing, and is often low enough for the ground to remain frozen hard for hours after the sun is up.

"There can be no doubt that she took to man-eating under stress of long starvation, due to the difficulty of securing game in the steep mountainous country in which she had established herself. Previous to her appearance tigers were unknown so far north in Jaunsár.

"About that time, however, professional graziers (Gujars), gradually forced to move eastwards from Kashmere owing to scarcity of grazing for their increasing herds, reached the Dehra Dún. The custom of these men is to remain in the hills until driven down to the Sub-Himalayan forests by the severe winter there. Our tigress thus no doubt followed the herds from the Dun forests, and got left behind when these went down again at the beginning of winter.

"She appears from the very first to have had cubs with her, which fact probably accounts for her great destructiveness and boldness soon after her arrival in the hills. In September 1880 she took up her quarters, with three nearly full-grown cubs, in the neighbourhood of Deoban, 3½ miles above Chakrata, and killed three men within a fortnight. One of these cubs was shot on September 15th by Mr. Smythies almost at the upper end of Chakrata, another was killed by Mr. Lowrie eight days later; while the third, put up with the mother in a beat only five days after, got away wounded. Through all the vigorous hunt after her and her cubs during a whole fortnight the tigress escaped scatheless.

"It has been already said above that she took to man-eating owing to the precipitous nature of her haunts, which prevented her from obtaining a sufficient supply of the usual food of tigers, *viz.*, deer, pigs, &c., and, when opportunity offers, cattle. The same circumstance drove her to attacking flocks of sheep and goats, which are very numerous in those rich high-level pastures during the period from the melting of the snows to the approach of winter. She would make one or more rushes through a flock, killing several animals, only a few of which she could eat. Thus her appetites were not

purely anthropophagous, although she no doubt preferred the flavour of the better nourished flesh of man. She often apparently disappeared for weeks and months at a time when she chanced to get in amongst a sufficiency of game. When this supply ran short, she would suddenly appear and attack men with increased persistence, killing several within a few days. As she grew older, her taste for human flesh increased, and her fear of man proportionately diminished.

"If near a herd of cattle she took no notice of the cattle, but went straight for the herdsmen. On one occasion, in June 1883, she walked at night into an out-office of the Lokhár rest-house, where some men were sleeping at the further end, a cow and her calf being tied up in the doorway. She passed these animals without taking any notice of them, and carried off one of the men.

"Mention of this last-mentioned event leads us to a necessary digression in order to recall to the reader's mind the highly imaginative account of the same, which appeared in June last in the *Civil and Military Gazette*, Lahore, and was subsequently reprinted by almost every newspaper in India, and even those in England. The wag who wrote that article put into his picture a bright moon, the invariable cubs, and the usual play with her victim which the fond mother goes in for in order to teach her offspring how to kill. The picture was still further embellished by several human figures perched up in surrounding trees, watching this spectacle of horror. What actually took place was simply this :—The movements of the affrighted cow and calf, and no doubt also the noise made by the tigress as she darted off with her victim, woke the other men, who began to interrogate one another as to the cause of the commotion. Some of them even went to the door to investigate. Everything was, however, still now, and the men rolled themselves up again in their bedding, not recognising in the dark that one of their number was missing. What happened in the meantime outside was that the tigress, alarmed by the sudden exclamations of the awakened sleepers, dropped her man and made off to one side. When all was quiet again, she came back and picked up the unfortunate man, who just then became conscious and groaned aloud with pain. Realizing at last the position of affairs, the men inside the room rushed out with loud cries only to see, in the dim light from the clouded sky, the tigress disappear with their comrade down the slope on to the road below. Mr. G. P. Chill, from whom we had the preceding details a few days after their occurrence, and who was sleeping in the rest-house, came out with his rifle on hearing the cries

of the men, but the tigress had already disappeared, and he merely fired off his weapon in the direction in which she had gone, in order to calm the fears of the men. We ourselves were on that eventful night in camp at Mundáli, only 5 miles from Lokháli, and the account we have given above accords in every particular not only with the information given by Mr. Chill, but also with that given to us directly by eye-witnesses, and by Dhan Singh, the headman of Lokhár, whom we met last only a few days after the death of the tigress.

"There was a strange fatality which always brought the tigress to Mundáli while we were there. In 1883 we spent two months at Mundáli, during the whole of which time she kept within the immediate neighbourhood. For several nights running she patrolled the road running along the main ridge above Mundáli, and also the bridle-path connecting Mundáli with that road. She often prowled round our camp at night, on two occasions coming right inside it. The first time she came it was past midnight, and every one was asleep. Our orderly was, however, fortunately sleeping lightly, and was suddenly awakened by the dull thuds of some heavy animal, like a buffalo (to use his own words), galloping down the soft slope just above his *shuldari*. A presentiment of the tigress' approach made him snatch up a brand from a large fire that was burning immediately outside the opening of the tent, and at the same time to shout away at the top of his voice. He had hardly begun doing this, when the flaps of the tent were suddenly flung open, and he found the brute glaring at him with only the log fire between them. His shouting awoke the half-dozen fellow-occupants of his tent, and between them they made such an infernal hullaballoo, while he kept flourishing the fire-brand across the opening of the tent in the face of the tigress that the beast could do nothing more than continue standing there and glare at the men. This went on for about two minutes, by which time the whole camp was astir, and a number of men, armed with bludgeons, fire-brands, and anything else they could pick up, rushed on the scene. Such an accession of force was of course rather more than the tigress had bargained for; she sprang back a few paces, tore up in her rage great clods of earth, and sulkily walked away, by the same route by which she came, into some cover not far off. The orderly's tent, which had been pitched about 30 yards in advance of the rest of the camp, was of course forthwith abandoned, and its occupants were only too glad to pass the rest of the night within the body of the camp.

"The next visit the tigress paid us was about 10 P.M., before any one

had turned in for the night. The moon, just passed her full, was concealed by clouds, but enough of her light passed through to enable objects up to 20 yards off to be discerned clearly. A party of the servants were sitting gossiping round a fire on the edge of a terrace. Suddenly one of the party, who was facing the edge of the terrace, caught sight of a crouching animal about 8 yards off. Instantly a hue and cry was raised, and the tigress sprang away and disappeared down the slope.

"A few days before our arrival at Mundáli the tigress had entered a cabin built of large hewn slabs, in which about 18 men were asleep, and walked off with one of the sleepers without awaking the rest. This incident and the attack on our orderly's tent combined to render us circumspect, and before retiring for the night we invariably bolted the doors and windows of the resthouse occupied by us. We are reminded of this circumstance by the remembrance of some raillery, of which we were the butt at a dinner party, and the purpose of which was to bring our courage into question. The scoffer, who will recognise himself when he reads this, laughed at the mere idea of the most daring man-eating tiger going *near* a house or tent, much less *entering* it. The evidence of the orderly and his companions who had seen the tigress by the light of their fire, the evidence of our own eyes, which had seen her well-marked foot-prints before the orderly's tent and in the soft soil of the slope beyond, went for nothing. In our terror a leopard had assumed the proportions of a tiger! Against the direct evidence of the eyes of several individuals, who were by no means griffs in the matter of tigers and leopards, the mere opinion of one individnal, who said that only a leopard could display the boldness this supposed tiger had been reported to have shown, was accepted as sufficient disproof. The supposed leopard has now been shot, after repeating all its previons performances, which it was so absolutely certain no tiger could have been guilty of; but, unfortunately for our scoffer, this leopard has had the bad grace to turn out to be a tiger, not the mythical tiger seen by the dim light of the camp fire through the spectacles of terror, but a real unmitigated tiger.

"For those who are still incapable of believing that a tiger can enter a tent or house, we will cite another instance which occurred last March. Sawing operations were going on just above the Tons, about 24 miles further in the interior of the Himalayas than Mundáli, and the sawyers were located in several huts huddled together by the side of the Tons–Ráma Sarái bridle-path. One night a tigress, who

had previously killed and eaten two people, and was accompanied by two young cubs, went up to one of the huts in the middle of the group, pushed open the door, entered the hut, stepped over the first sleeper, and seized the next one by the throat, causing instantaneous death.

"But to return to the Mundáli tigress. We have said before that by a strange fatality her visits and ours to Mundáli always coincided. On the 7th of May, 1889, we reached Mundáli in company with the Forest School students, who were on their hill tour. On our way we had been informed that she had just been killing two women in Ráma Saráí, and so we congratulated ourselves that she was well out of our way. Nevertheless we warned the students and their servants to be careful. One party of four European students pitched their tents on a spur about 80 yards above the place where our orderly's tent had been attacked six years ago. Towards 10 o'clock that night, the moon being up, one of the students hapened to come out of his tent, when only eight paces off he observed large animal standing at the same distance from their kitchen tent. He at once called to the others. The tigress, for she it was, finding herself observed before she was ready to do any damage, fled down the hill and disappeared. The students could hear the thuds of her footsteps as she sprang down the slope.

"The next night the same students, expecting another visit, sat up for the brute; but instead of turning up again at our camp, she killed some sheep belonging to shepherds, whom only four days previously she had followed up from Ráma Saráí to a high-level grazing ground about 1½ miles above Mundáli. One of these shepherds she had attempted to carry off two days previously, but missing her spring she only clawed his back and was driven off by the father of the young man striking her on the head with a stick, while a plucky large Bhutia dog seized her by the neck. This sudden double attack was too much for her, and she made off as fast as she came. Two of our students sat up the following night over the dead sheep, but although she prowled about the place and gave chase to several buffaloes, she did not come to the kills.

"The night of the 11th was dark and rainy, and we were sure the tigress would take advantage of this circumstance. And so she did. There was a herd of a buffaloes just above our camp. Here towards morning, as one of the herdsmen came out alone from the hut in which about ten of them were living together, the tigress suddenly

rushed at him. Luckily he dodged her and ran back into the hut. Foiled of her prey, she gave chase to a small but full-grown buffalo, which, taking fright, had separated from the herd and was running down the hill. She soon overtook the buffalo, and killed her just below the road immediately above the head of a deep and steep ravine. As soon as it was light, the herdsmen promptly moved off to another grazing ground about 2 miles nearer Chakrata. The tigress evidently followed them, for she was met just above that locality by our dâk man and syce, who saved themselves by shouting and howling at her like mad.

"On the news of the buffalo being killed reaching our camp, Mr. Osmaston, one of our latest recruits from Cooper's Hill, and Mr. W. Hearsey, one of our students, got a *machan* tied up near the kill, intending to sit up for the tigress towards evening. To prevent birds from interfering with the kill, Mr. Hearsey set a servant to watch it. About 2 P. M. this man came running back to say that he heard some heavy animal, most probably the tigress, coming up the ravine, above the head of which, as said before, the buffalo had been killed. Upon this Mr. Hansard, another student, came to ask us for the loan of our 12-bore Reilly, and to see whether Mr. Osmaston would accompany him. Fortunately, as the sequel proved, we had previously forced Mr. Osmaston to take the rifle as his own had been left behind at Chakrata for repairs. Both young men started off for the scene of the kill, intending to sit up on the *machan* for the tigress. But after having arrived there, Mr Hansard, who from the very beginning, not being able to realize what a terrible animal a tiger is, had thought of going after the brute on foot, proposed that they should go and look for her, arguing that if they sat on the *machan* they would never get her. Mr. Osmaston, who had arrived in this country only in January last, gaily closed in with this proposal. He, as said above, had our 12-bore Reilly, containing cartridges loaded with explosive conical bullets, nine of which go to the pound; Mr. Hansard, on the other hand, had only a smooth-bore, loaded with slugs. Armed thus, the two young *shikaris* moved down the hillside, each taking one side of the ravine. The sides of the ravine were so steep and rough (gradient in places exceeding 45°), that walking was extremely difficult, and Mr. Osmaston came down several times in spite of good screws in his boots. It was a good thing that the ground prevented them from moving at anything faster than a snail's pace, for, as events showed, there was ample cover in the shape of rocks and

bushes for a tiger to lie concealed within a few feet of the *shikari*, without being noticed by an inexperienced eye. When they had gone down about 180 yards, Mr. Osmaston's side of the ravine became too precipitous for him to walk along it, and he accordingly descended to the bottom with considerable difficulty over rocks, bushes and fallen trees. Meanwhile Mr. Hansard was walking parallel to him about 30 yards off on the steep slope immediately above. 'Suddenly,' to use Mr. Osmaston's own words, 'I heard a thud followed by a series of short, snappish, angry growls, and at the same moment I heard the groans and cries for help of Hansard crushed to the ground by the tigress and struggling, face downwards, to get free. The tigress appeared to be tearing his neck and face with her claws. As quickly as I could, I levelled the double 12-bore at the brute, and, although I was very much afraid of hitting Hansard, I knew it was the poor fellow's last chance. So I pulled the trigger, and to my relief saw the brute relax her hold and come rolling down the precipitous slope, which ended in a 15-foot drop, nearly sheer. The tigress never ceased her hideous growling even to the moment when she fell into the ravine and lay there in the water within a couple of yards of me. I was hemmed in on both sides, so I knew that if she was still capable of doing damage, it was all up with me. In sheer desperation, as my last chance, I fired the second barrel into her, and springing down the precipitous ravine—a feat which I don't think I could possibly perform a second time—I rushed up the side of the ravine and made for the place where I had seen Hansard lying, his face all gory and apparently dying. I could not, however, find him, and I rushed back to camp, the direction of which I more or less knew, across several spurs and ravines.'

"What happened to Mr. Hansard was this:—As he walked down the slope, the tigress must have perceived him and allowed him to pass on, probably then stalking him. At any rate she sprang upon him from behind, bearing him down at once. Fortunately all but one of her canines had been reduced to mere stumps, and it was probably because she knew this, and also because the slope was so steep, that she attempted to do little more than claw him. Even with her worn-down teeth, if she had seized his head between her jaws, she must have crunched his skull into fragments. Actually she clawed his face and back, dislocating the jaw, but the only dangerous wound she inflicted was with her solitary effective canine, making a hole just behind the ear and penetrating to the back of the mouth. It was a

fortunate thing that before the brute could inflict further damage Mr. Osmaston's first shot did for her. The bullet entered in the region of the loins a few inches below the spine. But as the shot was fired from below, the bullet went up against the spine, which it practically broke, and then worked along under it raking it, and blowing up everything in its way until it reached the lungs, where it stopped. This first shot thus completely disabled the animal and rendered her perfectly harmless. The second bullet hit her in the shoulder. A minute after the second shot was fired, Mr. Osmaston's chaprassi, who was at the *machan*, hearing his master's cries for help, rushed down the ravine, and found the tigress stone-dead and Mr. Hansard lying insensible in the water at the bottom of the ravine. After the tigress had let go her hold and rolled down the slope, Mr. Hansard, thinking she would come back for him, had crawled down into the ravine, only to find himself within 10 yards of his enemy, who was of course already dead. It was lucky for him that the shot against her spine had made the tigress at once relax her hold of him, otherwise he would have rolled down with her and been certainly killed in the fall.

Measured soon after death the length of the tigress was found to be 8 feet 8 inches. Her canines, as said before, had been worn down all but one, to mere stumps. Some of them were cracked and chipping off, and two were quite decayed with a hole running through the centre. The buffalo killed by her had not a single tooth-mark on it, and hardly any portion of it had been eaten; its neck had been broken. The tigress was in miserable condition, hardly any fat being found even round her kidneys. Although she killed a good deal, her broken teeth must have prevented her from eating anything like a full meal.

Mr. Hansard was attended to immediately by the Native Doctor attached to the School, and on the third day was carried into Chakrata, where, under Dr. Butterworth's skilful treatment, he made such rapid progress towards recovery at the Military Hospital, that before the end of June he could be removed to Mussoorie, a distance of 40 miles. At Mussoorie, however, the results of blood-poisoning manifested themselves in feverish symptoms of a very severe type, and a series of abscesses formed at the end of the wound behind the ear, which, pressing up against the brain, rendered him delirious for weeks. He has now, however, got through the worst, and it is to be hoped that plenty of rest and

a good climate, combined with his youth, will soon enable him to recover his health and strength completely.

ELEMENTARY BOTANY OF THE BOMBAY PRESIDENCY.

By A. K. Nairne.

In the paper which appeared in the Society's Journal for January, 1889, I described a number of common plants of Western India belonging to several different orders but all agreeing in having tubular and more or less two-lipped corolla, and four stamens on the corolla arranged in a longer and a shorter pair (didynamous). In this paper I shall confine myself to the plants of one great order—the largest but one of all the natural orders—*Leguminosæ*. This has an immense number of species spread all over the globe, and derives its name from its fruit, a legume or pod. A legume is described as a two-valved fruit opening length-ways, and having the seeds attached along the inner edge of the valves, that is, along the side of the pod which does not open.

This may be called the constant feature of the order, but it is not sufficient for the unlearned; because there are many plants in the order in which the fruit is so modified as not to be easily recognised as a pod, and there are also some plants belonging to other orders with fruit not easily distinguishable from pods. It is therefore necessary to look for a second feature common to the *Leguminosæ*, and this as regards a great majority of its plants is found in the corolla.

In my first paper I mentioned the great distinctions of monopetalous and polypetalous corollas. The corollas in *Leguminosæ* is of the latter sort, that is, of separate petals. There is however a great distinction between different flowers, which is more easily recognisable even than that already named, *i. e.*, the distinction of regular and irregular corollas. Those are called regular in which the petals, if the flower is polypetalous, (or the divisions of the corolla if it is monopetalous), are equal and symmetrical, so that no difference can be seen between the upper, lower, right or left side of the corolla. But the first glance at an irregular flower shows that it has no such uniform symmetry, the centre of the flower being unequal, surrounded by the

parts, and the petals often varying as much in shape as in size. There are few flowers which have corollas more absolutely irregular than those of *Leguminosæ*, as regards the great majority of its plants. The corollas have a name given to plants of this order alone, papilionaceous (from *papilio*, a butterfly), or pea-shaped, having five separate petals, one at the top, generally large and broad, and called the standard, a pair opposite to the standard, joined together and enclosing the stamens and pistil, called the keel, and a smaller lateral pair, distinct and standing forward, called the wings. It may be added that the ten stamens are generally united into one cluster, (monadelphous), or into two clusters (diadelphous), and that the calyx generally adheres to the pod.

The typical *Leguminosæ* then have pea-shaped flowers and pods; but as there are some genera and species in which the fruit is not pod-like, so there are some which have flowers not pea-shaped, and among these exceptions we find a number in which the flowers are absolutely regular.

The order is therefore divided into three sub-orders, which really might as well have been three separate orders.

1. *Papilionaceæ.* Flowers strictly as above, but the pod in some cases much modified.

2. *Cæsalpineæ.* Flowers not truly papilionaceous, but approaching it and irregular; stamens as above, but free from the petals; pod unmodified.

3. *Mimoseæ.* Flowers very small and regular, the petals usually united above the base; stamens often indefinite; pod unmodified.

It may be added that the plants of the first sub-order (which is by far the largest of the three), are mostly herbs, and are found all over the world; while those of the other two sub-orders are mostly trees or shrubs confined to warm climates.

SUB-ORDER I.—*PAPILIONACEÆ.*

The sub-order is represented in W. India by 54 genera, some of which contain a very large number of species. They are distributed over eight tribes, some of which have very distinct features, usually connected with the divisions of the leaves and the shape of the pods. As however I am only giving a selection from the species known, it will, I think, be simpler to omit these distinctions of tribes, and to mention instead any feature that may be common to three or

four genera as they come, my great object, of course, being to make identification as easy as possible.

NOTE.—As before, D. stands for Dalzell and Gibson's *Bombay Flora*, H. for Hooker's *Indian Flora;* native names are in italics, and I should mention with regard to this part of it, that I have now the advantage of referring to Dr. Dymock's "Marathi Names of Plants," which I was unable to do when I wrote my last paper.

1. *Crotalaria.* Leaves (in species here given) simple; flowers yellow (except No. 5 below); standard with a short claw; pod straight, turgid or inflated.

(1) *C. filipes.* A small, prostrate, slender-stemmed plant with long hairs; leaves oblique, cordate, oblong; peduncles very slender, bearing one or two flowers; pod oblong, much inflated, 8 to 10-seeded. Deccan and Konkan common.

NOTE.—There is another small and common prostrate plant very like this, and growing in similar situations;

Heylandia latebrosa. The most obvious difference is that that has solitary and subsessile flowers in the axils, and an ovate pod with one or two seeds.

(2) *C. retusa.* A stout undershrub, branched, nearly smooth; leaves oblong, broader above; flowers large and handsome, veined red, in long racemes; pod linear, oblong; seeds 15 to 20. *Ghágrí.* Konkan, Guzerat and Ghauts, common

NOTE.—This and the next two have a general resemblance to the English broom.

(3) *C. sericea.* Much like the last, but with angled stem and large leafy stipules and bracts. Common about Bombay.

(4) *C. Leschenaultii.* A tall and very handsome shrub; leaves narrow, obovate, silky beneath; racemes and flowers large; pod like the two last. *Dingala.* Common at Matheran and on the Ghauts.

(5) *C. verrucosa.* Stout herbaceous, stems and branches 4-sided and winged; leaves broad, ovate, narrow at the base; stipules half-moon shape; flowers pale blue; pods nearly cylindric, pale brown. *Tirat.* Very common on the sandy sea shore.

(6) *C. juncea.* A tall erect shrub; leaves linear or oblong, silky; racemes very long; calyx covered with rusty hairs; pod sessile, oblong, broader upwards. *Santag.* Commonly cultivated for the fibre, and sometimes called sun-hemp.

NOTE.—There are altogether 21 species of this genus in W. India, three of which have 3-foliate and one 5-foliate leaves.

2 *Trigonella.* Leaves trifoliate; leaflets toothed; standard and wings narrow; keel shorter; pod many-seeded.

T. fœnugrecum. Erect, robust; leaflets lanceolate, oval or obovate; flowers yellow, pretty, long, thin and pointed. *Methi.* Usually cultivated for báji.

3. *Medicago.* Leaves as the last; pod spirally twisted, indehiscent.

M. sativa. Stem usually erect; leaflets oblong; flowers somewhat racemed, usually purple; pods downy and loosely spiral. Purple medick, lucerne (*loosan*). Cultivated everywhere.

4. *Indigofera.* Indigo. Flowers generally in racemes, red or purple; keel spurred on each side near the base, generally linear or cylindrical.

NOTE.—There is not much beauty in this large genus; most of the species are a good deal covered with close-pressed hairs.

(1) *I. linifolia.* A small grey plant, much branched; leaves lanceolate or linear, sometimes obovate; flowers in very short racemes; pod round, one-seeded. *Burburra, bhangrá, torki.* Throughout India. H.

NOTE.—The seed vessel in this is not the least like a pod outwardly.

(2) *I. cordifolia.* Small and diffuse; leaves broad, ovate cordate; flowers very small, in sessile heads; pod oval, 2-seeded. *Godadi, bodago, botsaka.* Deccan and Konkan. Plains of India generally. H.

(3) *I. glandulosa.* Also a small diffuse species; leaflets 3, deeply pitted with glands underneath; pod brown or reddish, very short angled and with toothed wings. *Vekhári, baraghadam.* The Deccan. Very common everywhere. (*Lisboa.*) On black soil it becomes woody and much branched.

(4 *I. trita.* Much like the last, but more of a shrub and more rigid, the leaves red, pitted; pod long, straight, horizontal, slightly 4-sided. Common.

(5) *I. hirsuta.* A coarse, hairy, erect herb; leaflets 5 to 11, large, obovate; racemes dense; flowers pink; pods crowded, straight, bent down. South Konkan, Guzerat, &c. Graham called it particularly common on Malabar Hill.

(6) *I. tinctoria.* The cultivated indigo; leaflets 9 to 13; flowers greenish or yellowish red; pod turgid, straight, sharp-pointed. *Nil.* D. thinks that it is found wild in many parts of the Konkan. H. doubts it being wild in India at all.

(7) *I. pulchella.* A tall shrub, with long erect racemes of pink or light purple flowers; leaflets 13 to 21; pod straight, cylindrical or turgid, sharp-pointed. *Chimnáti, nirda.* Mahableshwar and other high Ghauts. This is the only handsome species found in W. India, and is very ornamental.

7. *Psoralea.* Leaves simple, dotted with glands, petals all clawed; pod ovoid or oblong, one-seeded, indehiscent.

P. corylifolia A tall stragging plant; leaves ovate or roundish; irregularly toothed; flowers small, violet coloured, tipped darker, in close long stalked spikes; pod included in the granular calyx. *Bawarchí.* A common weed in the Deccan and elsewhere, especially in cultivated fields. H. calls the corolla yellow.

8. *Tephrosia.* Petals clawed; pod linear, flat, many-seeded.

T. purpurea. Half shrubby, more or less hairy, with a most offensive smell; leaflets 6 to 10 pair, oblong or obovate; flowers red or purple, in long racemes; legumes slightly curved. *Sirpaká, unhála.* A common rank weed springing up in the rains along with *Cassia occidentalis.* There are varieties of this in Sind, Cutch and elsewhere.

9. *Sesbania.* Herbs or soft wooded shrubs; leaves with very numerous deciduous leaflets; petals long, clawed; pods very long and narrow.

(1) *S. aculeata.* Tall and weak, with stem and petioles covered with soft prickles; leaflets 20 to 40 pair, very small, obtuse; flowers in racemes, yellow dotted with purple; calyx nearly entire; pod nearly cylindrical, sharp-pointed. *Rán shewani, chinchani.* Known (in the Konkan) by its wonderfully rapid growth, springing up to the height of 7 or 8 feet in a very few weeks of the rains. H. calls it cosmopolitan in the tropics of the Old World.

(2) *S. grandiflora.* A tree with very large white flowers and curved pods, a foot or more long. Both flowers and pods are eaten. Commonly cultivated but a doubtful native. *Agáshi, hadgi.*

The next 5 genera have pods composed of joints, which when ripe easily separate from one another.

10. *Geissapsis.* Leaflets 2 pairs; flowers with conspicuous membranous bracts.

G. cristata. A trailing plant among grass; leaflets small, obovate; flowers small, orange and brown, each with a large roundish bract edged with stiff brown hairs; pod of 2 round joints. *Barki.* It is a remarkable looking plant, but common.

Zornia angustifolia, also called *barki*, is a little plant of much the same character as this, the 2 pair of leaflets longer and narrow, the bracts sagittate and almost hiding the flowers, the joints of the pods prickly, and sometimes as many as 5.

11. *Alhagi.* Leaves simple; joints of pod several.

A. maurorum, Camel-thorn. A low shrub with green branches and strong hard thorns, one to each leaf; leaves sessile, oblong or obovate, rather fleshy; flowers small, red or purple, in short racemes, which end in a bristly point. *Jawás, Kás.* Very common in Guzerat and Sind, where it is the usual material for tatties.

12. *Smithia.* Herbs; leaflets many, small; corolla yellow, generally with red spots at the base of the petals; joints of the pod flattened and folded together within the calyx.

Note.—Of 12 Indian species 9 are found in this Presidency, and all within a very limited range, *viz.*, the S. Konkan and the Ghauts bounding it; one or two species also about Belgaum. None of the species can be called common, though some are abundant locally; they are all remarkable for their beauty, and at Dápoli, *S. sensitiva*, *S. bigemina*, and *S. pycnantha* all appear together in the rains. One only, *S. purpurea*, has purple flowers with white spots at the base.

13. *Alysicarpus.* Diffuse plants; leaves generally simple; keel obtuse, adhering to the wings; pod of several joints flattened, not twisted.

(1) *A. vaginalis.* Rather hairy; leaves from oval to lanceolate, cordate at base; stipules large; flowers in racemes, red, whitish beneath; pod thickened at the joints, which are not much divided; calyx in fruit large and chaffy. *Chái, dhámpta.* Common in the Deccan, Konkan and Guzerat. H. makes (2) *A. nummularifolius*, which has roundish leaves, and pods almost cylindrical only, a variety of this. It also is common.

14. *Desmodium.* Leaves simple or trifoliate; pod of several joints, often straight on one side and divided on the other.

(1) *D. triquetrum.* A shrubby rather hairy plant, with triangular branches; leaves ovate, with winged petioles; stipules large, lanceolate; flowers small, in long erect racemes, purple or violet; pod of about 6 irregular joints, beaked. *Kákyánja.* Common and easily recognizable.

(2) *D. gangeticum* is sufficiently like this to be recognised as a relation. Stems irregularly angled; leaves broad, ovate, rather cordate. *Sálwan.* Bombay and S. Konkan.

The next two genera are of the Vetch tribe, distinguished by pinnate leaves ending in a tendril.

15. *Abrus.* Climbers, with only 9 stamens united in a tube split above; style short, incurved.

A. precatorius. A small climber; stem woody; leaflets numerous, oblong, blunt; pod linear, flat beaked; seeds like a small pea, scarlet, with black spot. *Gunj, chanoti.* Very common in hedges, but not very attractive. The very pretty seeds are used as weights by goldsmiths. There is a varicty with white seeds, spotted black.

16. *Cicer.* Leaflets toothed; flowers solitary; pod sessile, turgid, tipped with the style.

C. arietinum. Gram. Has generally a terminal leaflet instead of a tendril. *Harbara, channa.*

The next 9 genera (belonging to tribe *Phaseoleæ*) are either climbers or trees, with trifoliate leaves (except *Clitoria*) and linear pods.

17. *Mucuna.* Flowers large; keel larger than the standard and wings; pod covered with stinging hairs.

M. pruriens. A hairy twincr; leaflets ovate, unequal-sided; flowers lurid purple, in drooping racemes; pod large, curved, more or less S-shaped. *Háwaj, Kuhili, Kuyeri.* Common in hedges (from the Himalayas to Ceylon.) H. The pods are awkward to touch, owing to the stinging hairs.

18. *Erythrina.* Trees with prickly branches and red flowers; pod turgid.

E. Indica. Indian coral tree. Bark light and greenish; petioles very long; flowers large, in racemes; pod several inches long, very protuberant at the seeds, which are dark red. *Pángara, máudár.* One of the commonest and showiest trees in the Konkan. A white-flowered variety is said to grow in Salsette.

19. *Butea.* Trees or climbing shrubs; flowers large and showy; keel much curved; pod linear, with one seed at the point.

B. frondosa. Petioles long; leaflets large, roundish; flowers many together in long racemes, orange red and silky; calyx and pedicels deep bottle green; pod thin and downy. *Pallas, Kákria.* This is even a more striking tree than the last when in flower, which is before the leaves appear. It is common in most parts, but not in S. Konkan, and is called *dhák* in Bengal, &c.

20. *Canavalia.* Flowers showy; standard large, roundish; pod thick, three keeled.

C. ensiformis. A large smooth twiner; leaflets ovate, pointed; flowers rather large, of a beautiful pink; sometimes purplish, in long-stalked racemes; pod large, plantain-shaped. *Gáora.* Pretty common in hedges. A variety is commonly cultivated for food.

21. *Phaseolus.* Bracts usually conspicuous; keel much twisted; pod more or less cylindrical

P. trilobus. A straggling plant; leaflets ovate, usually 3-lobed; flowers small, yellow, in long-stalked racemes or heads. *Arkmath, jangli math.* Common and unattractive. It varies greatly in hairiness. *P. mungo, urid, mung*; *P. aconitifolius, math*; *P. rostratus, halálhonda*; and *P. vulgaris,* French bean, are all cultivated.

22. *Vigna.* Like the last, but the keel much less twisted.

V. vexillata. Twining, with broad ovate acute leaflets; flowers rather large, pink, few together at the end of a long stalk, fragrant; pod 3 or 4 inches long, many-seeded, hairy. *Birambol, halula.* Pretty common in the Konkan and found at Mahableshwar. The handsome flowers remind one strongly of the sweet-pea, but without its delicacy. Cosmopolitan in the tropics. H.

V. catiang is the cultivated *chaoli.*

23. *Clitoria.* Flowers very showy; leaflets up to 7; standard spoon-shaped, very large.

C. ternatea. A beautiful climber; leaflets ovate; flowers solitary, deep blue and white, with 4 long bracts; pod straight and thin. *Bhovera, Kájali.* Common in hedges in many parts, and at once noticeable by the size and shape of the standard.

24. *Dolichos.* Petals usually equal in length; pod flat, recurved.

D. lablab, pauti. Cultivated in the Konkan as a cold-weather crop, and *D. biflorus, kulti,* cultivated in the Deccan.

25. *Cylista.* Corolla enclosed in a large scarious calyx, and petals equal in length; pod small, oblique, enclosed in the calyx.

C. scariosa. Leaflets ovate, wrinkled, downy; flowers in racemes; corolla yellow, red streaked, hidden in the large, withered-looking calyx; a bract of the same shape soon falls off. *Rángáora.* The Konkan and Ghauts. Very common in Salsette.

26. *Cajanus.* An erect shrub; petals equal in length; pod straight, tipped with the style.

C. indicus. Pigeon pea. Silky; leaves trifoliate; leaflets oblong, lanceolate; flowers yellow, often veined with red, 2 or 3 inches long. *Tur, Dál.* Cultivated all over India for the grain, and the stalks used in making gunpowder.

The remaining species of *Papilionaceæ* here given are either trees or climbing shrubs, with odd-pinnate leaves and indehiscent pods.

27. *Dalbergia.* Leaflets alternate; flowers small, white or pale, only half opening; pod thin and flat, 1 to 5-seeded.

(1) *D. latifolia.* The blackwood tree. Leaflets 3 to 7, roundish, either with a small point or notched; flowers yellowish-white, in small close panicles; pod lanceolate. *Sissa, Kálruka, táli.* Common in S. Konkan and S. M. Country, also on the Ghauts. The *Sissu* or *Shisham* of N. India is a different tree, *D. Sissu*: it is thought by Dr. Brandis to be indigenous in Guzerat.

(2) *D. paniculata.* Bark light grey, smooth; leaflets 5 to 6 pair, ovate or obovate; flowers in large panicles, tinged with blue; calyx greenish-white; pod lanceolate, pointed. *Pasi, pádri.* Mawal districts and Matheran, N. Konkan. In the Panch Mahals it is a common and pretty tree, rather resembling the *Karanj.*

28. *Pongamia.* Leaflets opposite; pod woody, oblong, flattened.

P. glabra. Leaflets 5 to 7, ovate, smooth, rather large; flowers in axillary racemes, pale, deciduous; the standard large; calyx entire, brown; pod more or less oval, with short beak, 1 or 2-seeded. *Karanj, Sukhchain.* One of the commonest and handsomest trees in the Konkan: not seen much at any great distance from the sea.

29. *Derris.* Climbers; leaflets opposite; calyx often coloured; pod thin and flat, more or less winged.

D. uliginosa. Smooth; leaflets 3 to 5, oval, rather blunt and fleshy; flowers small, pretty, pale rose-colour, in erect panicles; calyx reddish brown, with shallow teeth; pod nearly round, veined, winged at the upper edge and with a hooked point

Common near the sea, but also found in other parts.

SUB-ORDER II.—*CÆSALPINEÆ.*

The species of this sub-order are mostly trees or shrubs, very often of great beauty; but there are only 8 genera represented in Western India, and these vary a good deal, so that it is not easy to mention any species as typical of the whole sub-order.

1. *Cæsalpinia* Prickly shrubs with showy yellow flowers; calyx deeply cleft, the lowest lobe largest and hooded; petals spreading.

(1) *C. bonducella.* A large climber; pinnæ 4 to 8 pair; leaflets about 4 pair, smooth, oblong, obtuse; flowers in racemes, each with a lanceolate bract; calyx rusty; pod ovate, swelling; very prickly;

seeds 2, large. *Sagargota, Kachki, Karbat.* Common in hedges; most so in Guzerat, I think.

(2) *C. sepiaria.* Spreading, smooth; pinnæ 6 to 10 pairs; leaflets 8 to 12 pairs, linear, oblong, obtuse; racemes large, erect; calyx coloured; pod linear, oblong, smooth, with a long abrupt point, 4 to 8-seeded. *Chillar.* Common in the Deccan. It makes an impenetrable fence.

C. coriaria is the *libi*, or *dividivi* tree.

2. *Poinciana.* Erect, unarmed trees, differing from the last in having a valvate calyx of 5 equal segments.

P. pulcherríma, the common *gulmohar* (gold-mohur tree); *P. regia*, the royal gold-mohur: both well known.

P. elata, sandesrá, is a much less ornamental species with white flowers changing to yellow, and long dark filaments. H. calls it truly wild in the W. peninsula, but D. and Graham knew it only in gardens.

3. *Cassia.* Sometimes herbs; flowers rather large, yellow; some of the stamens often imperfect or obsolete; the petiole or midrib often with one are two conspicuous glands.

C. fistula. Tree; leaflets 4 to 8 pairs, large, ovate, pointed, smooth; flowers in long drooping racemes; pod quite cylindrical, brown, smooth, one or two feet long. *Báwa, garmála, chimkani* The Ghauts and Konkan. Common throughout the forest tracts of India. (*Brandis.*) This beautiful jungle tree is well known and easily recognised by the likeness of its flowers to laburnum.

(2) *C. occidentalis.* A large, smooth annual; leaflets 3 to 5 pair, ovate, lanceolate, acute; flowers long-stalked; pod long, thin, nearly cylindric. *Thorala tákla, Kásoda, Kasundro.* Abundant in waste places nearly everywhere, springing up very quickly in the rains, generally with *Tephrosia purpurea.* It has a strong offensive smell.

(3) *C. sophora.* } Closely allied to the last and with the same
(4) *C. tora.* } native names, but shrubby; the pod in the first more swollen, particularly towards the top, in the second very long and slender, 4-sided, sharp-pointed. Very common, and both found generally throughout India. H.

(5) *C. absus.* A hairy plant, above a foot high; leaflets 2 pair, unequal sided; flowers solitary or in a short raceme; pod nearly straight, strap-shaped, bristly. *Chimar, chaksu.* This is very common both at Bandora and Dápoli, and I believe elsewhere,

but is not given by D. Everywhere in the tropics of the Old World. H.

(6) *C. pumila.* A low or procumbent plant, with 10 to 30 pairs of leaflets, very small and unequal-sided ; flowers above the axils; pod flat, linear. *Sarmal.* Common generally. *C glauca.* A tree with a heavy smell, *karud*, is commonly cultivated.

4 *Saraca.* Corolla none ; calyx coloured, long-tubed, with 4 unequal segments ; stamens 3 to 8, long, exserted.

S. Indica. A small tree ; leaflets 3 to 6 pair ; flowers in large round heads, orange-coloured, changing to red bracts, &c., coloured ; pod broad, flat, leathery. *Ashoka, jasondi.* Konkan and Ghauts, not very common. This was the tree formerly and appropriately called *Jonesia ashoka*, the name of the illustrious Sir William Jones being thus joined to the Sanscrit name. No one would from the flower guess that it belonged to the *Leguminosæ.*

5. *Tamarindus.* Petals 3, the upper hooded ; stamens 3, monadelphous ; pod pulpy within.

T. Indica. Tamarind tree. Leaflets very numerous, obtuse ; flowers few together, in lax racemes; pod thick, more or less curved. *Chinch, amli.* H. calls it a doubtful native. The flowers of this also are unlike the order.

6. *Bauhinia.* Flowers showy ; petals generally clawed ; stamens sometimes imperfect ; leaves simple, deeply 2-lobed.

B. racemosa. A small crooked tree ; flowers in racemes, yellow or white ; calyx spathulate, split on one side ; pod woody, thick. *Apta, âsandra.* Common in most parts. There are two or three other species, either wild or planted, and they are all easily recognised by the leaves, which are almost unique in shape, being almost round, but divided into two lobes from the top, the division extending sometimes nearly to the petiole, sometimes only a short way down.

SUB-ORDER III.—*MIMOSEÆ.*

Leaves (in all here given) bi-pinnate ; flowers very small but many together ; petals equal.

NOTE.—There is a great resemblance in the flowers of the many species of this sub-order, so that any one who knows any of the acacias would probably recognize any of the species here given as belonging to the same family ; but it should be mentioned that the tree commonly called the acacia in England, *Robinia pseudo-acacia,*

belongs to the *Papilionaceæ*. There are only 7 genera of the sub-order represented in W. India.

1. *Entada.* Woody climbers with tendrils; flowers in spikes; calyx minute; stamens 10; pod jointed outwardly.

E. scandens. An immense climber, the main stem often with a spiral wing; spikes about 6 inches long, white, becoming yellow; pod a yard long; flowers hard and woody, reddish brown. *Garbi, Gardal, Khairi.* The Ghauts and Konkan hills. The immense pods of this must be known to many who have never handled either the flowers or the leaves, for these often grow so high above the ground as to be quite inaccessible.

2. *Mimosa.* Leaves sensitive; flowers in dense round heads, stamens 8 or 10; pod flat-jointed.

M. hamata. A thorny shrub; heads of flowers pink, long-stalked; pod curved, with a border on each edge and large hooked prickles. *Aikar.* Pretty common in the Deccan and Guzerat.

M. rubricaulis. Very like this, but the flowers reddish, becoming white, and the pod longer and thinner, is attributed by D. and Graham to Malabar Hill, and by H. called common throngh India. I have seen it only in the E. Deccan.

3. *Acacia.* Prickly shrubs or trees, with yellow or white flowers, in round heads or cylindrical spikes; stamens indefinite, free, much exserted.

Note.—Most or all of the species have glands on the petiole or between the pinnæ or both, and the leaflets are small.

(1) *A. arabica.* Thorns straight, white; flowers in round heads, yellow, fragrant. This is the well-known *babúl* tree, and like most of the genus, is an inhabitant of dry regions.

(2) *A. suma.* A small tree with white bark and hooked thorns, in pairs; flowers white, in spikes; pod strap-shaped, straight. *Khair, Khaderi.* This delicate looking and pretty tree takes the place of the *babul* in the Konkan.

(3) *A. concinna.* A large climbing shrub; prickles hooked; flowers yellow or white, fragrant, the round heads in panicles; pod thick and succulent, contracted between the seeds. *Chikakai.* Common in the Konkan and Ghauts: the pods are used for soap.

(4) *A. pennata.* A large climbing shrub; thorns straight or nearly so; flower as in the last; pod straight, thin, often reddish. *Shembi.* Common in the Konkan: the bark is used for dyeing nets.

4. *Albizzia.* Large unarmed trees; flowers in round heads; stamens indefinite, very long, united at the base; pod long, thin, strap-shaped.

(1) *A. lebbek.* Flowers white, very fragrant; heads long, stalked or irregularly racemed; pod nearly a foot long, smooth, straw-coloured. *Siras, farari.* Common in the Konkan and elsewhere.

(2) *A. stipulata.* Stipules large, acute, reddish; heads of flowers in panicles, the long brush-like stamens pink in the upper half; pod reddish brown, smooth. *Lallai, shembar.* This very beautiful flat-topped tree of the Ghauts and S. Konkan grows in perfection at Matheran. It is as well to mention here the only tree belonging to another order, which is likely to be taken for one of the *Leguminosæ.* The order is *Moringeæ,* which contains only one genus and 3 species, but botanists have found the greatest difficulty in fixing the position it should occupy. Outwardly, however, it much resembles *Leguminosæ.*

Moringa. Trees with soft wood; leaves alternate; petals 5, unequal; stamens 5 perfect and 5 imperfect; capsule pod-like.

M. pterygosperma. The horse-radish tree. Leaves very large, twice or thrice pinnate; leaflets very small; calyx as well as petals white; capsule a foot long, slender, 3-angled. *Sheogá, shekla.* Generally cultivated. *M. concanensis* is very like this, but the leaves and panicles larger; the flowers yellowish, red-streaked and fragrant. *Sainjna, mua.* Wild in the Konkan.

The above list will be found, I think, to include all the leguminous plants that are common or very noticeable in the Bombay Presidency, and a large proportion of them are very common. And if all orders of plants could be as easily identified as the *Leguminosæ,* we might expect Botany to become a much more popular study. But I must repeat what I said in my first paper, that if any one begins by getting up the common plants of a few of the largest orders, he will by the time he knows them have got his eye so well in, and know so much of botanical terms and principles, and probably also will be so much interested in the work of identification, that he will find no great difficulty in proceeding to the less easy orders.

NOTES ON A CATERPILLAR FARM.

By Mrs. W. E. Hart.

During the last rains in Bombay we started a small caterpillar farm, noting whatever seemed to us worthy of remark in the life history of the insects. Some of these notes we venture to offer in the hope they may interest some of your entomologist readers. Our stock from first to last consisted of eighty-six head of insects, belonging to forty-one species. Being new to the work, we unfortunately kept all our specimens in the same enclosure. The result was that, like the twins in Mr. Locker's famous song, they "got completely mixed," and we were unable to say with certainty, in some instances, which imago resulted from which pupa, or, indeed, in the case of some of the buried pupæ, to identify beyond a doubt the pupa with its larva. The following notes on twenty-seven cases give the results only of such observations as we are sure are correct throughout.

But first, as much by way of warning as example to other beginners in the same interesting pursuit, we will describe our system. We need not say we shall be very thankful for such suggestions of improvement as any of your readers may kindly trouble themselves to offer.

Across a window in a well-lighted room we set a table about four feet long by two wide by two and a half high, with an upright rim of thin wood, about two inches high, running all round its top. Its feet stood in saucers of water to prevent the approach of ants and other noxious visitants. But this precaution was not wholly successful, as we forgot to clear of other insects all the plants and earth introduced for the caterpillars. The result, in one instance, was that the ants so imported devoured alive a caterpillar half turned into a chrysalis, as he was trying to bury himself in a box of earth.*

* A somewhat similar catastrophe befel a very large caterpillar we had at Matheran in May. He buried himself apparently in good health on 20th May. On 3rd June about thirty flies were found in the cage. As no imago appeared from the caterpillar, we exhumed him, and discovered that he had very literally been "eaten of worms," which, after making their way out of his abdomen, immediately constructed little cells of the earth round their victim, in which to pass their pupahood, and from which they emerged in the shape of the flies we found in the cage. The caterpillar's carcase, when we found it, consisted of the empty desiccated skin with a mass of earthen cells protruding from its abdominal region in such a manner as to suggest that its late proprietor had burst himself in trying to swallow a mud honeycomb. He must have been "fly-blown" before he buried himself, and carried the eggs with him underground, where the larvæ of the flies were hatched inside him and requited his hospitality by devouring him.

A companion was saved from a like Herodian end by being removed from the earth before he was attacked, and then suspended from the roof of the cage in a twisted cone of brown paper, where he developed into a "death's-head" moth.

The cage was a light movable frame of wood, just fitting inside the rim round the table, and about two feet high. Over this was stretched mosquito net for the sides, ends, and top. The table thus formed the floor of the cage, but to allow of its being more easily kept clean, it was carpeted with large sheets of coarse brown paper. The dimensions of the cage gave ample space for the butterflies and moths to stretch and dry their wings on emerging from their chrysalises. But to avoid the confusion mentioned above, it would have been better had the cage been divided into compartments. In the middle of one of the long sides was the door, the frame of which, made of the same wood as that of the cage, was about ten inches wide, and of the same height as the cage. It was closed by a loose curtain of mosquito net tacked to the bottom of the cage, folding over the top, and wide enough to well overlap the doorway on each side. This was fastened by loose strips of thin bamboo sprung in against the uprights and across the top of the doorway. It was wide enough to allow a hand and arm to pass in to manipulate the contents of the cage, or a head to observe its inmates, without moving the cage at the risk of disturbing such caterpillars and cocoons as might be clinging to the sides or top. It would, however, be convenient, and for a cage divided into compartments necessary, instead of one small door in the centre of the side, to have the whole side constructed on the same principle.

In the cage we put some vases, standing steadily on wide heavy bottoms, for water, in which to immerse the stalks of sprigs from the food-plants of our caterpillars. The tops of such vases should be covered with cards pierced with holes, through which to pass the stalks into the water, for we found that to leave them uncovered resulted in the death by drowning of some caterpillars, who crawled down the stalks into the water, and were too fat or to stupid to turn round and crawl up again. Besides these vases, we put into the cage some boxes of earth for the accommodation of those insects who pass their pupahood underground, and a few chunks of soft rotten wood for those who prefer that element. Some twisted cones of brown paper in the corners offered quiet seclusion for such caterpillars as seek retirement from the world, without digging their own graves, making thir own coffins, or weaving their own shrouds.

In regard to the management of stock, experience taught us four great canons: 1, Never handle a specimen; 2, keep the species distinct; 3, diet each specimen only on the plant on which it was found; and 4, when a caterpillar leaves its food-plant, leave it alone.

1. Even the gentlest handling of a caterpillar or chrysalis, resulting in no apparent injury at the time, we found was often followed, especially in the larger sorts, by a malformation or imperfect development of the imago. Sometimes the ill-consequences declared themselves sooner or more disastrously, and the caterpillar, though showing no external marks of ill-treatment, sickened and died. In one notable instance, a very fine specimen, tenderly picked off a plant by a servant with his finger and thumb, and carefully brought upstairs in his closed fist, so resented the liberty, that, as graphically described by a lady friend, "it fermented and burst" within twenty-four hours. A specimen should be collected by carefully picking the twig on which it is fonnd and transferring both together to the box. Where this is imposible, and in the rare instances in which it is necessary to move a caterpillar or chrysalis in the cage, it should be lifted by means of a leaf, very gently pushed under it, and not raised until the insect is wholly on it. When the food and water are changed, which should be daily if possible, the caterpillars must not be forcibly transferred to the new leaves. If any leaf on which a caterpillar is engaged be picked off the old sprig and gently placed on the new, the caterpillar will soon of its own accord leave the stale leaf for the fresh.

2. Provided they get food enough, any number of individuals of the same species apparently will dwell together in harmony on the same sprig. But with individuals of different species the case is otherwise. In confinement, the members of some species seem to resent the mere neighbourhood of those of another in a manner almost human. We had the caterpillar of the "death's-head" moth above-mentioned on a Caladium leaf, and two caterpillars of *Danais chrysippus* on a sprig of *Calotropis gigantea* in the same vase. The "death's-head," wishing to change his skin, left his food plant, as the manner of many caterpillars is at such times, and tried to make his way through his neighbour's territory. But the Danaides, holding views as pronounced as those of any English game-preserving squire on the rights of property and the iniquity of trespass, set on the intruder, and so belaboured him that we were obliged to put his

Caladium leaf in a separate vase. Even then he was not safe, for the two vases being one day unhappily set so close together that one of the Calotropis leaves hung over so as to touch the Caladium leaf, the Danaides crossed into their enemy's country and renewed their attack. We could not see whether they actually bit him. If they did, they did not seem to penetrate his skin. But they butted and hustled him on both sides in a way that must have been painful to so soft-bodied a creature, till at last he fell off the plant on to the floor of the cage, where he lay stunned and apparently exhausted for nearly half an hour. It may have been this treatment that drove him to seek, sooner than he would have done, shelter in the pupa form in the box of earth whence we afterwards had to rescue him from the ants. For as an imago, though perfectly developed and well coloured, he was under-sized.

3. A change of leaf seems as bad for a caterpillar as a change of milk for a baby: silkworms, no doubt, "as every school-boy knows," can be fed indiscriminately on mulberry, lettuce, or dandelion leaves without worse effect than a difference in the colour of the silk. But this omnivoracity seems to be a peculiarity in the constitution of the silkworm, induced, perhaps, by its Chinese education. With the wild caterpillar of the Indian jungle, it is not so. To thrive, he must have only that plant to which he has been accustomed from his earliest infancy. Though caterpillars of the same species are found on plants of quite different species, and each will thrive equally well on its own food-plant, yet the same individual should not be fed on a different variety of plant, however closely allied to that which is its natural food. Thus we found a caterpillar taken on a sweet lime* (*Citrus limetta*) could not be fed with the leaves of a sour lime† (*Citrus acida*), nor even one found on a jungle mango‡ (*Mangifera indica*) with leaves from a garden fruit tree. The new food will either be entirely rejected, and the caterpillar die of starvation, or it will so internally disagree that death will result from fermentation and explosion, in the manner above described as the effect of handling.

4. A caterpillar leaving its food-plant to wander about the cage, generally does so only in search of a quiet place to change its skin or turn into a chrysalis. To be disturbed at such times, even by benevolent attentions, is likely to result in disaster. The best way is to leave it quite alone, only placing the food-plant near it in such a

* Native name, *Mita nimba*. † Native name, *Nimbu*. ‡ Native name, *Am*.

position that it can easily return to it when, like Mrs. Gamp, "so dispoged." In a few species, however, this roving tendency seems to be the result of a constitutional impatience of restraint, such as gipsies and Highlanders are said to feel under the artificial conditions of life in civilized cities. Such caterpillars we never succeeded in rearing. They were principally of two sorts, a small black hairy one found in great numbers on pipal trees during July and August, and a larger lighter-coloured one, also hairy, found in equal numbers about the same time on the mango trees at the foot of Chinchpoogly Hill in and around the Sewri Cemetery. Though plentifully supplied with their proper food, they refused all sustenance, and wandering about the floor, walls, and roof of their prison, died at last of broken hearts—or empty stomachs. Generally speaking, however, caterpillars do not seem to suffer from nostalgia, but accommodate themselves to their altered circumstances, provided they are properly fed and not injudiciously handled.

Now for our results. Of the twenty-seven cases here noted, sixteen resulted in butterflies, and eleven in moths. Of the sixteen butterflies ten belonged to the sub-family *Papilioninæ*, and six to *Danainæ*.

Of the *Papilioninæ*, six were *Papilio agamemnon*, a handsome green and black butterfly, common in Bombay, but a good specimen of which it is hard to catch, owing to its quick high flight and restless habits; three were *Papilio pammon*, also a common butterfly in Bombay, the males of which, also restless and quick fliers, are black with a row of cream-coloured spots round the posterior margin of the hind wings, which are also shortly "swallow-tailed," and the females of which are commonly black and red, in imitation of two other species, *Diphilus* and *Hector*, as described in a paper on "Mimicry" at page 228 of the 4th volume of this Journal; one was *Paplio panope*, a rare butterfly in Bombay, of which there is only one specimen in the Society's collection. It is dark-brown, with a double row of cream-coloured arrow-head shaped marks round the margins of both wings, and an orange spot on the bottom of the hind wing. Of the *Danainæ*, four were *Euplœa core*, one of the commonest butterflies in Bombay, moderately large, but a weak flier, of a purplish-brown colour, with a double row of white spots round the edges of the wings; two were *Danais chrysippus*, also one of the commonest butterflies in Bombay, and a weak flier of moderately large size, in colour bright terra-cotta, the forewings tipped with black and white, and the hindwings bordered with a narrow black band.

Papilio agamemnon.—Nos. 1, 2, and 3 were found on the upper side of leaves of *Guatteria longifolia** at the Ladies' Gymkhana on 28th July. They were then barely ¾ inch long, and of a smoky gray colour, slender at the tail end, but thickening so rapidly towards the head as to have a bulbous appearance. The body was smooth, but furnished with eight short tentacles, two by the eyes, four at the thickest part of the body, and two at the tail. Besides these, were two retractile tentacles of a paler yellowish colour in the front of the head, generally invisible, but shot out whenever the caterpillar was annoyed or alarmed, as, for instance, when blown upon. The use of these seems to be to startle birds and other enemies, and deter them from an intended attack, by the appearance of a sting. But in reality these tentacles are as soft and innocuous as the others.† On 29th July these caterpillars changed their skins, and immediately ate their cast skins. This perfection of cannibalism seems not uncommon among caterpillars till the second or third change of skin, after which they abandon their carnivorous, or rather cutivorous habits, and adhere to a strictly vegetable diet. The subjects of this memoir grew rapidly till they were about 1½ inch long, their colour changing gradually meanwhile to that of the leaves on which they fed.‡ By 3rd August all three were completely clad in bright green. No. 1 assumed the chrysalis form on 5th August, No. 2 on 6th, and No. 3 on 10th. The chrysalises were of the same green colour as the caterpillars, and attached in a nearly upright position by the tail end to the stalks or undersides of the leaves. The imago appeared of No. 1 on 18th August, of No. 2 on 19th, and of No. 3 on 20th. The last was therefore three days less *in statu pupillari* than the others, but the imago seemed as well developed in all respects.

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* Native name, *Asok*.

† Weismann, in his *Studies in the Theory of Descent*, has noticed the "terrifying attitudes" assumed by certain caterpillars as a protection from the attacks of insectivorous enemies. The retractile tentacles of the larva of *P. agamemnon* can hardly be intended for use as antennæ, or they would be permanently protruded, like the front pair of tentacles of the larva of *Euplœa core* described below.

‡ For a very interesting account of the colours of caterpillars, and their relations to the food plant and surroundings of the insects, see Weismann's *Studies*, cited above, translated by Meldola, and the translator's notes. The subject has been excellently investigated by Mr. Poulton in a series of papers of great interest contributed to the *Transactions of the Entomological Society in* 1885-6-7, *The British Association Reports*, 1867, and the *Proceedings of the Zoological Society*, 1887.

Nos. 4, 5, and 6 were found on 4th September on a "Soursop"* (*Anona muricata*) in our garden at Cumballa Hill. Two of them were rather larger than the specimens just described when first found. The third was so much smaller he could hardly have belonged to the same brood. He was soon lost, being probably thrown away with the old leaves when the food was changed, an accident which should be guarded against by careful examination of both sides of the leaves and the stalks. Of the remaining two, one came to his end by drowning in the manner already described. The third entered on his pupahood on 19th September, and the imago appeared on 30th, taking two days less than Nos. 1 and 2 and one day more than No. 3. One 21st September we observed a female of *Papilio agamemnon* laying eggs singly on the bark of twigs of *Guatteria longifolia* on the Pedder Road. We secured a few, but they were unfortunately lost before they were hatched. From the dates above given, however, it would appear that *P. agamemnon* in Bombay continues to breed at least through July, August, and September.

In early infancy the larvæ of this species resemble the droppings of small birds, but not so strongly as do those of the species next described.

Papilio pammon.—We retain the name by which the specimens in the Society's collection are named, and under which certain habits of mimicry in the larvæ and pupa were described at page 229 of the 4th volume of the Society's Journal, but Mr. de Nicéville prefers the name *P. polytes* for this species.

Nos. 1 and 2 were found, apparently just hatched, on the upper-side of the leaves of a sweet lime (*Citrus limetta*) in our garden on 1st August. Their remarkable resemblance at first to bird-droppings, and afterwards to the leaves of the food-plant, as well in shape and position as in colour, has already been described in the paper above mentioned. The protective imitation by the larvæ of this species is much closer than by those of *P. agamemnon*, possibly because they are not furnished with the same forbidding tentacles.

Our specimens attained to the length of about 1½ inches before assuming the pupa form. This No. 1 did on 9th August and emerged a perfect male imago on 20th. No. 2 was "found drowned" on 10th August, when apparently on the point of turning into a

* Native name, *Bilaiti nona.*

chrysalis. No. 3 was taken on the same tree as the others, but some weeks later, and belonged probably to another brood. She assumed the pupa form on 27th August, and a female imago of the *Diphilus** type resulted therefrom on 7th September.

These dates again would seem to show that this species breeds in Bombay all through the months of July, August and September at least.

For a day before assuming the pupa form, the larva remains motionless, closely hugging the stalk of the leaf on which it is resting. But the pupa is attached only by the tail end, with its head upwards, inclined at an angle of about 30° from the stem, and steadied by two guy ropes of almost invisible gossamer. We did not succeed in witnessing the exact moment and manner of this change of position, as in both instances it took place during the night.

Papilio panope.—The very handsome caterpillar of this species, rare in Bombay, was found on the upper side of a leaf of a Cinnamon tree† (*Cinnamomum zeylonicum*) in our garden on 14th August. It was then upwards of 2 in. long, and on the point of assuming the chrysalis form, which it did on the 16th. The imago emerged on 31st August with the tip of its right forewing damaged, owing probably to careless handling of the larva by the servant who brought it in. The larva, which was somewhat deeply jointed, was of an olive-green colour, with small black dots, and larger crimson spots on the joints, and broad irregular markings of cream colour on the sides and back. On the back and head were short black tentacles. The chrysalis, attached by short black silky hairs at the tail end to one of the uprights of the cage, head upwards, in the nearly vertical position characteristic of the *Papilionidæ*, and of a light brownish gray, marked with deeper brown and black, very closely resembled the rough bark or a piece of dead wood. The imago seems to imitate *Euplœa core*, which is also imitated by the female of *Hypolimnas bolina*.

Euplœa core.—These curious caterpillars were found on *Anodendron paniculatum*,‡ in the Ladies' Gymkhana, on 31st July. They were smooth, slender, and of a general reddish brown colour, but

* Here again we preserve the name given to this species in the Society's Collection and in the paper above mentioned, but Mr. de Nicéville prefers the name *Aristolochiæ*.

† Native name, *Dalchini*.

‡ Native name, *Lamtani*.

on the back a very pale mauve, and closely marked with narrow dark brown transverse rings. They were furnished with eight dark brown tentacles arranged in pairs; one, long and pointing forward, nsed as antennæ, above the second pair of legs from the head; another, shorter, above the third; another, yet shorter, between the third and fourth; and another, about the same length as the second, at the tail. In assuming the pupa form, which they did when about 2 inches long, they underwent a remarkable change. Leaving the food plant, they attached themselves to the undersides of other leaves, where, losing all likeness to caterpillars, and indeed to any living creature, they appeared to turn into unpleasant looking lumps of muddy slime or gum. These gradually assumed shape, hardening and brightening, till on the third day they were unmistakable chrysalises of burnished gold, hanging by the ends of their tails, with their heads downwards. The imago appeared in from seven to eight days after the chrysalis had assumed its bright metallic appearance.

Danais chrysippus.—These were found on *Calotropis gigantea** in our compound, on 15th September. In general appearance as to size, shape, tentacles, and dark ring markings of the body, they were not unlike the caterpillars last described, but differed from them in colour, being of a pale blue gray on the back, with yellow sides, and having ten pairs of oval yellow spots edged with black along the back. They assumed the chrysalis form on 17th September in the same position as those last described, and leaving the food plant to do so, but passing through no intermediate slimy stage. Of the chrysalises, one, which was suspended from the brown woodwork of the cage was green, the other, suspended from the white mosquito net, was pale pink. Both opened on 24th September. We could detect no difference in the butterflies, except that in the one from the green chrysalis the rings round the underside of the abdomen were narrow, black, and continuously linear, while in the other they were broader, brown, and so deflected towards the centre from the sides as to have a somewhat crenate appearance. These butterflies are imitated by the female of *Hypolimnas mussipus*. The dichroic character of the pupa is noticed by Messrs. Marshall and de Nicéville in their very valuable work on the Butterflies of India, Burma and Ceylon (Vol. I., p. 51), where Mr. Wood-Mason is cited to the effect that the difference in colour is not sexual but a protec-

* Native name, *Mudar*.

tive resemblance, in the one instance to the leaf, in the other to the flower-bud of the food plant. Our specimens, it will be observed, chose positions in which such protective resemblance could have no value. We thought the difference in colour might possibly be due to a difference in the light, as the chrysalis in the darker position, attached to the brown opaque body, was the darker in colour, while that in the lighter position, attached to the white transparent curtain, was itself almost white.* The point would seem to be worth further careful investigation. That light has an effect on animal coloration as well as vegetable is beyond a question. This effect in insect life would appear to be illustrated by a gradual change from pale cream colour to orange of the lighter-coloured portions of the wing of *Papilio erithonius*.

Of the eleven moths, one, the "death's-head" already mentioned, belonged to the family *Sphingidæ*, and four tussore moths (*Saturnia mylitta* to *Bombycidæ*. The remaining six belonged to two species, one to the first and five to the second, which we have been unable to determine.

Death's-Head.—We have not named this specimen, as it differs so much in size, and in some respects in appearance, from others in our collection. The caterpillar was found on a Caladium lēaf in our garden on 17th September. It was then about three inches long, smooth, of a grass green colour, with seven whitish diagonal lines each side. At the head end it had two peacock blue eyes in yellow spectacles, at the tail end a fulvous tentacle. It had its first encounter with the caterpillars of *Danais chrysippus* on 19th September, and its second on the 24th. On the 25th we found it trying to bury itself, and suspended it from the roof of the cage as already described. There we left it when we started for Mahableshwar on 11th October, but found on the 27th that the moth had emerged in the interval. In general appearance it resembled the largest specimen of the family (*Acherontia styx*) in our collection, that is to say, its forewings were of a dark mottled brown, paling to yellowish, faintly clouded with white at the tips, and its hind wings were yellow, marked with brown, while its body was dark purple with a narrow longitudinal streak of yellow on each side, and six black transverse rings. But it was far inferior in size,

* This theory would seem to derive some support from a beautiful experiment by Mr. Poulton in 1887, showing that the bright surroundings of larvæ kept in a gilt-lined box favour the production of golden pupæ.

measuring barely four iuches across the outspread wings, while the other was nearly six, and the skull mark was brown instead of white.

Saturnia mylitta.—These were found on *Zizyphus jujuba** in our compound on 4th September. When brought in, one had already completed, and another was just completing, its cocoon. The third had just begun to spin, and finished on the same day. The fourth, which was still in its larva stage and feeding heartily, was rather more than three inches long, sparsely haired in tufts, somewhat deeply jointed, and very thick in proportion to its length. It was bright green in colour, with a triangular dark brown mark near the tail, its apex pointing forward, and a yellowish line running from it to near the head. On this line, at the head end, were two bright gold spots, and below it, between each pair of legs, a small oval orange spot with brown edges. About the head were a few small orange spots, and one rather larger dark brown. It cocooned on 5th September. The cocoons were a pale whity brown colour, egg-shaped, about two inches in length, and suspended from the twigs of the leaf plant, two or three leaves of which were drawn down on to the sides of the cocoon. They opened, at the upper end, the first on 21st September, the second on the 22nd. The moths from both of these were males. The two other cocoons opened on the 25th September, and the moths from them were females. All through the night of the 25th September we suffered from a regular plague of tussore moths attracted into the house by our specimens. We caught twelve of them, all males, some with their wings in so tattered a condition that the wonder was they could fly at all. During the next day one of the females laid a number of eggs in clusters on the twigs of the food plant in the cage. The other laid none. Whether it would have done so had we waited we cannot say, for to avoid a repetition of the previous night's invasion we got rid of all our specimens before dark, and were left in peace. As we were shortly leaving Bombay, we did not try to raise any caterpillars from the eggs, but put them out on a *Bear* tree in the compound to shift for themselves. The caterpillars seemed to be earlier this year than last, for a single caterpillar that we secured in 1888 did not cocoon till 4th October. The cocoon did not open till 5th November, but this may possibly have been because we took it up to Mahableshwar with us.

* Native name *Bear*.

Of the unnamed moths, No. 1 was found on 13th August in our compound, on a wild brown-speckled arum that comes up in profusion in the rains all through the jungle on Cumballa Hill. It was smooth, pale green, with a long black tentacle at the tail, and near the head two grass green eyes edged with bright yellow, below which were two yellow spots. When found it was about 2½ inches long. It chrysalised in earth, but scarcely going beneath the surface, on 16th August. The imago appeared on 4th September, a large female moth of a general pale ashy brown colour, with broad bands of darker brown across the wings. The forewings were deeply scooped along the inner margin, and both fore and hind wings were scalloped along the posterior margin. The body, which was very thick, was ringed with five fine transverse white lines. The pectinated antennæ were deeply hooked at the ends. Two males, attracted into the house from outside, were also secured on 5th September. The female laid a large number of eggs singly about the roof and walls of the cage on 6th and 7th September, almost all of which were hatched on 13th. The larvæ were pale yellow with a tentacle of the same colour, very long in proportion to the length of the body, at the tail end. We were unable to rear any of them, as the food plant had unfortunately withered after the rains.

Nos. 2—6, small hairy caterpillars, dark brown, slightly marked with yellow and red, and so thick-bodied towards the head end as to present a somewhat "hump-backed" appearance, were found on 14th August on *Ficus heterophylla*,* on Cumballa Hill. They assumed the pupa form in loose cocoons of yellow fluff in cones of brown paper on 22nd August. The imago of one appeared on 3rd September, and of the others on the 4th. The moth, thick-bodied, and with pectinated antennæ, was about an inch across the wings, very downy, yellow, with two black spots near the tip of the forewing, and one near its posterior margin. It is a very common one in the house during the rains in Bombay.

In concluding these notes, we would warn the reader to be cautious in using the native nomenclature, which is apt to be a little indiscriminate, at least among those ignorant persons of the lower orders who are most likely to be employed to assist in the work of a caterpillar farm. For instance, we found the name *Asok* freely be-

* Native name *Karowti*.

stowed on several sorts of trees besides the *Guatteria*. So, too, *Karunja* seems to be used indifferently for a thorny bush with a blue berry and a thornless tree with a flat round pod. While *Zizyphus jujuba* is called by some a *bear*, and by others a *boar*. But the strangest difficulty we had with names was in regard to the caterpillars themselves. Native opinion seems to be divided as to whether a caterpillar is a centipide, scorpion, spider, devil, worm, or something else. Hence on enquiry in different quarters, we were differently informed that the name of these janwars is saturi, bichu, makra, bhoot, kiri, or kushrun. On the whole, the worms had it. So our pets were generally known as kiri.

"DOWN THE COAST."

By W. F. Sinclair, C.S.

(*Read at the Society's Meeting on 12th November* 1889.)

On a former occasion I described to you a voyage to the Isle-fort of Janjira by the creeks. It is a good terminus; and I propose, to-day, to revisit it by another route, indicated by the title of this discourse, and starting from Alibag.

We must on this occasion suppose an early spring tide and start, as for our last trip, a little before high water, say, at 9 A. M.

Our place of embarkation is a long sandbank, so low that the highest monsoon tides sometimes wash over it, and covered with innumerable shells, all dead and worn, but many still entire, and often much more beautiful in decay than they were in life.

Behind this is a little lagoon, filled by the rising tide, and then a few hundred yards of sand, green here and there with wiry shore grass, and backed by a long line of palm orchards, like Mahim Woods. Like these, too, they contain a population of some thousand souls; and my reason for bringing them particularly to your notice is, that they cover what was, within recent history, exactly such a bank as that from which we sail. Their lagoon is now a salt-marsh in course of transformation into rice-fields, and if, as we suppose, the thing that has been is that which shall be, the sand-bank of to-day will be the town and garden of another generation. I wonder if it will read this prophecy there.

On our left, or landward, side, as we face south, we see the line of the palm trees stretching some seven miles, till it seems to

stop at the foot of a range of wooded hills, some 800 feet high, ending to the seaward in a low fortified peak, whereof we shall have a better view later in the day. Due west, upon our right hand, the Isle-fort of Kolaba, at this state of tide, rises apparently sheer from the water, a range of crumbling fortifications, about twenty feet high in most parts, topped by abundant foliage, including that of a few palm trees, and varied by a couple of temples.

Over the highest northern tower a tall white flagstaff, with a square yard, shines in the morning sun like a silver cross. This marks the warning-signal station, where watch is kept day and night in favour of the traffic of Bombay. It has saved many vessels and many lives; and I seldom see that cross in the sky without a mental quotation of the "*In hoc signo vinces.*" But it is not always victorious; and on one very recent occasion its warning was not attended to in time to prevent a serious accident.

All round the fort, and beyond it for miles, the reefs lie hidden under the flood-tide. Only to the southward, and almost on our course, a black tower, rising straight from the water, marks one of the worst—the Chaul Kadu reef. Just by its foot an occasional wave breaks on the almost forgotten wreck of the P. & O. steam-ship "Jeddo."

Close before us the breach of the sea marks a sand bar forming the other side of the creek, and we being by this time embarked, steer to cross it, where a cocoanut stem marks the passage over the bar.

This, just at present, is in use as the perch of a sea-eagle (*Haliœtus leucogaster*), who is so well aware that we will not hurt him, that he lets the boat come close enough for us to see his eye, and admire his snow-white head and breast, contrasted, sea-gull-like, with a slate-grey back and wings. Then, rather as despising than fearing our neighbourhood, he lazily flaps away upon over a fathom of wing.

Half-a-dozen handsome black and white birds head across the bow, and the men look to the stern sheets as if they expected the shot to be taken; but it is not well to spend time in shooting on this trip, for we want all our daylight. These are Oyster-catchers,* or

* I have in a former number noted the apparent error in Jerdon's *Birds of India*, where the truncated beak, so common in European Oyster-catchers is noted as a *generic* distinction. I have examined many specimens in the British Museum and here, and now believe it to be only the result of wear, having never found it in my Indian specimens. None of these have the completely red bill of many European birds, the coloration is that described by Jerdon, orange with black tip. Further Indian observations are required.

"sea-pies," which abound here. Some remain all the year round, and probably breed on the sandhills of the shore to our left.

Further out, a flock of ducks are wheeling over the water as if looking where to alight, and they pass near enough to be recognised by the white wing-mark as "White-eyed Pochards," the commonest sea-duck hereabouts. By this time we have poled out of the creek against the tide, and set our sail to a light land breeze, which wants the help of oars to move the boat, and will presently die away in "cat's paws."

But by this time we are well clear of bank and reef, and have already found the ebb tide running down the coast at the rate of nearly three knots an hour; and this, with our oars, carries us down some six miles, till we pass within half a mile of the fortified point mentioned before.

This is Korlai, or "Castle Curlew," once known as the "Morro of Chaul" to the Portuguese, who took it by storm from the kings of Ahmednagar, pulled it down, and rebuilt it. Inside and north of it we can see the opening of a great creek, full of native shipping, and flanked on the other (north) side by an extensive European fortification. This is the Agarkot, or "garden fort" of Rewadanda, once a walled town crowded with palaces, convents, and the other incidents of Portuguese colonization. It now contains little beyond nuts and trees, mostly cocoanut palms, which hang over the ruinous ramparts. Only one tall Franciscan tower shows itself above the palms, a mere shell, and covered with vegetation, but still erect.

A fishing boat running for the port answers our hail with a yell of "Waghade"="Tigerlings," which is rather good news, as these are not named from their vice, but from their stripes, and are, in fact, Mackerel (*Scomber microlepidotus*).

They are not so large as the English ones, but quite equal in quality, if properly cooked while fresh, and we can have more than enough for our whole ship's company for a rupee. By way of variety, we take the change in sardines, which are commonly in season here along with the mackerel, and much better than the tinned article. Our cooks mostly know how to treat them *à l'huile*, which is the classic method; but at present they may go on to the gridiron along with the mackerel, and, just in time, the forenoon calm of the tropic coast gives way to the sea-breeze and the oars can be got in, which leaves space for getting breakfast ready, as we run down the shore of Little Ethiopia (Habsán).

This would naturally have begun at Korlai, the southern point of the mouth of the Kundalika, as that river is the "March burn." But the powers that have in succession held Chaul harbour (which we now commonly call Rewadanda) have always made a point of having both sides of it, and we, like the Marathas before us, and the Portuguese before them (and so on backward), hold both banks at the mouth.

The coast, however, seems rather to protest against this political arrangement. As we pass clear of Korlai it changes in character.

The hills, which on the Alibag coast were several miles inland, now close upon the sea in solid rank; the yellow sands are only in patches along the black basaltic shore, and but few palm trees adorn the first port we pass in Janjira. This is Borlai, quaintly named after the dwarf-ringed-plovers (*Ægialitis*) of the shore, as its neighbour Korlai, after the curlew.

It is a tolerable fine-weather port, but beyond it the wooded hills come down to the sea, ending in low cliffs running out to the point of Dandi. All this while we are deepening our water, for the bottom of the sea has changed as much as the beach, and so we find ourselves amongst neighbours who at Alibag were in the offing, and only occasionally close with that shore. The sardines have come up from the south in force, and the scene is lively enough.

Every here and there we can see gulls and terns fishing, though this form of bird-life is not so abundant here as at home. Occasionally, a little crowd of them marks the presence of a shoal of sardines, on which they are working, or a rough rippling patch, the play of a school of mackerel. Scabbard-fish and garfish, like little silver arrows, frequently leap close to the boat, or scramble out of her way along the surface, and one or two actually jump into her and slip through the kit stowed amidships into the bottom.

The large Dolphins (gâdha) are alive all round, rolling, plunging, and cutting somersaults amongst the sardines and mackerel; and just as we are watching one very lively group to leeward, there is a strange snoring sound behind us, and a cry of "Deo Mâsa" among the crew, one or two of whom raise their hands in salute.

We turn just in time to see the last of a great black object half a mile away, but the whale—for whale he is—must rise again presently, and if he keeps his course under water, will rise quite as near as we care to see him; and "there he blows" again, sure enough,

at little more than a cable's length. He is apparently a small Finback, or Rorqual, perhaps 40 feet long.

You notice that he does not "spout" as whales do in pictures and poems. The fact is that no whale habitually spouts water. But in northern seas the hot-water-laden air from his lungs is condensed by the colder atmosphere into a cloud of steam, or even drops of water. Here and now the air is as warm outside the whale as inside him. Wounded whales do certainly sometimes spout blood, and I suppose that a sick one might throw up other things besides ambergris and Jonah; but colds in the head and bloody noses are no more normal to whales than to ourselves, though probably plentier than prophets or perfumes. Again our whale rises, and still nearer; but as he disappears we see for an instant his tail in the air. He has seen more of the boat than he likes, and will change his course, of which I am not sorry, liking his room better than his company, since we are not in the way of boiling him down. He has accompanied us past a mile or more of very inviting looking sand; but we know that it is fringed all along with reefs dangerous even to our small craft. Behind it the wooded hills rise steep, and it ends in a head land, bolder and more picturesque than Dandi, with high detached crags—Adi Point. A little beyond this, however, the hill recedes in a great crescent, and Nandgaum Bay shows again the familiar long line of palm-trees with their edging of almost white sand.

Yiúr (or Vihur) Point, beyond it, is bluff and wild again; but rounding it, we come in sight of a great bay, evidently leading far inland. In fact we know of old where it goes, for right in the middle of the narrow waist of it stands our old acquaintance, the sea-castle of Janjira; and we have just been signalled as rounding the point by the nearer and smaller isle fort of Kansa, a sort of calf to the great fortress, which we pass under the salute. The tide has turned these two hours, and the boat is going up the bay at a speed of probably five knots an hour, heading for the far end of a line of cocoa palms on the north side, faced with many white buildings. This is Murud, the working metropolis of the State under its present ruler, who has given up living on a rock in the water like a garefowl on an "All-alone-stone," as his ancestors did.

The apparently unbroken line of white foam before us is on the bar, and it makes a man hold his breath as the boat rushes before flood tide and sea-breeze into an opening that seems scarce wider than herself. Instantly the helm goes down, and she comes up

almost into the wind, and as quickly falls away again into the next bend of the channel. Seven times must the helm be shifted in a cable's length of that pass; but with the seventh turn we float out of the foam into a deep, calm, little harbour, where the palms hang almost over the water, and our trip down the coast is over.

THE INDIAN BISON, WITH SOME NOTES ON STALKING HIM.

By J. D. Inverarity.

(*Read at the Society's Meeting on 1st October* 1889.)

My first introduction to the Indian Bison was in the pages of "The Old Forest Ranger," when I was a very small boy. My youthful imagination was so excited by the account of the bull, who is there described as coming on at headlong speed, his tail on end, his bloodshot eye rolling in the frenzy of madness, his tongue lolling far out of his mouth, and the white foam flying from his distended jaws, that I there and then determined that when I grew up I should do little else than shoot bison, and though circumstances have prevented my carrying out that intention to its fullest extent, I have spent several hot weather vacations in the pursuit of that animal; and I propose in this paper to give a brief outline of its habits, supplemented by some observations as to the mode of bringing him to bag. Sportsmen in the early part of this century do not seem to have known much about bison. No mention whatever is made of him in Captain Williamson's "Field Sports," the second edition of which was published in 1819. In Dr. Johnson's Sketches of Indian Field Sports, he says "there is also another species of animal in Ramghur called Gour, a kind of wild bullock of a prodigious size, not well known to Europeans. I have never obtained a sight of them, but have often seen the prints of their feet, the impression of one of them covering as large a space as a common china plate"!

In the *Oriental Sporting Magazine* of July 1829, there is an account of what was evidently Bison shooting under the title of "Buffalo Hunt," and the quarry are alluded to throughout as

"buffalo." In the May number of the same Magazine for 1831, a correspondent gives an account of bison, and remarks "I allude to Bison, which some maintain to be a wild buffalo and others the common cow in its natural state, from both of which animals it is quite distinct." The first sporting works which, as far as I know, dealt with bison shooting, are the "Old Forest Ranger" and "My Indian Journal," both by Campbell of Skipness. Since then numerous sportsmen have described their experiences of bison in print. The best and most reliable accounts to my mind are to be found in the "Highlands of Central India" and Mr. Sanderson's book. None of the illustrations of bison in any of the published books give even an approximately good representation of what a bison is like. The best I think, is the one in "My Indian Journal," but it errs in exaggerating the thickness of the withers. The legs also are wrongly coloured. They are shown as being white from below the knee, whereas in truth the white stockings on the legs begin from the top of the knee, and in the hind legs from the point of the hock. The same mistake is made in the picture of the Bull Bison in Mr. Sanderson's book. The white legs are correctly shown in the illustrations in the "Highlands of Central India" and in "Seonee." I have several photos. here of bison which prove what I say as to this. The only other ruminants that I know of with white legs are the wild buffalo and the old buck of the Sinde ibex (*Capra ægagrus*), the white of their legs begin in exactly the same spot, which is a curious circumstance. Jerdon's description of the bison, which I need not repeat here, is a very good one, except that he says "legs from the knee downwards white," whereas it ought to be "from above the knee downwards." There is a stuffed bull and cow bison in the Natural History Museum at South Kensington, but they are poor specimens. In general appearance the younger bulls look a dark coffee brown, the old bulls look jet black. An old cow also sometimes looks almost black. A very young calf is a light yellow, though they soon get brown. The most noticeable feature about the bison is the extraordinary development of the spinous processes of the dorsal vertebræ, usually known as the dorsal ridge; the spinous processes continue all along the lumbar vertebræ, but are much smaller behind the termination of the dorsal ridge. The dorsal ridge is formed by a row of single bones springing from the back-bone immediately behind the junction of each pair of ribs, of which the Indian bison has 13 pairs. They slope backwards. The height of the dorsal ridge at the highest point above the back-

bone in a skeleton that I measured was 15 inches, but I forget whether this was along the bone, which as I have said slopes backward, or vertical measurement. The highest point was about the 5th or 6th rib, the exact spot I omitted to make a note of. The height of the dorsal ridge at the highest point above the line of back of an animal in the flesh looks about 5 or 6 inches only. The dorsal ridge terminates abruptly at the last rib. I have said the Indian bison has only 13 pairs of ribs, which is the same number as are possessed by domestic cattle. In fact naturalists tell us that the Indian bison is not a bison at all, but belongs to the Taurine group. The Bisontine group comprises the bison of Europe and North America, the Musk Ox and the Yak. The European bison is stated by Jerdon to possess 14 pairs of ribs. The American bison 15 pairs. I have here a photo. of a bison skeleton cleaned by vultures, the remnants of skin and flesh sticking to the bones prevent the details being so clear as they would be in a photo. taken from a skeleton properly prepared.

The foot in shape and appearance is like a deer's, though of course larger. It does not, however, approach the size of the common china plate mentioned by Dr. Johnson. It is probably the smallest foot of any animal in proportion to the size and weight it has to support. The forefeet are rather larger than the hind feet. The eye I should describe as brown, though all books state it is pale blue. It is true that when the light falls on it at particular angles it looks a beautiful blue. This is caused by the tapetum lucidum, a membrane behind the eye-ball of a lovely peacock blue colour. It is this membrane which causes an animal's eyes to shine in the dark. In the human eye it is opaque and black. The bison has no dewlap, although the skin of the neck about half way down the throat suddenly gets thicker, and in some old bulls looks like the beginning of a dewlap. The head has also certain peculiarities, the forehead being concave, and the top of the skull rising in an arch above the base of the horns. The face in profile shows a distinctly aquiline and ram like nose. Most stuffed heads fail to reprodnce this. The height of a bull bison at the shoulder in the Central Provinces in my opinion does not exceed 5ft. 9 in. or 5ft. 10. I have shot many very old bulls. I have only measured the height when they struck me as particularly large, and the largest measured 5 ft. 9½ inches. He was a coal black bull, with horns broken, and very blunt at the points, sticking out almost horizontally, with hardly any curve. The measurements were:—Widest span, 38½ inches; between the points, 34 inches; round base, 18 inches; right horn

in length, 24 inches; left horn, 22 inches. It is not easy to measure the height accurately. The distance between a stake driven in at the shoulder, and another at the heel of the forefoot is the proper measurement to take. To the top of the dorsal ridge is of course some inches higher. I have not measured a cow, but they are, I should judge, a good 4 inches less. Measurements given in most of the sporting books run to 6 feet and over. I do not believe any such are to be found in the Central Provinces, though I quite believe that in Southern India they may attain that size. In fact I saw once on the Annamallay Hills an enormous bull that looked well over 6 feet. He was lying with a herd out on the green slopes of the hill at an elevation of between 6 and 7,000 feet, 200 yards clear of the forest, and was the biggest bull I ever saw, with a very wide head, but I failed to get near him. The heads I have seen from Southern India are much finer than the Central Provinces heads. The horns in the latter, as a rule, do not spring up so high from the head as the former ones. The curve of the horn seems to me to be lower, as will be seen from the following measurements of the vertical line drawn from a line between the tops of the horns and the top of the skull of 5 bulls, the other measurements of the heads are also given in inches:—

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5
Widest span	34	33¾	32½	32	31
Length, Right	22½	24¾	26½	24	25
Do. Left	26	24¾	25	23¼	26
Between Points	28	22½	17½	20½	20
Round Base	17	16	15	15	14
Vertical height of horns above skull	8¾	9	7¾	7⅝	9

Nos. 1 and 3 were solitary bulls. No. 2 was with a single cow. No. 4 was shot out of a large herd. No. 5 was in company of a bull and a cow with a malformed head; see head No. 7. Though I have shot better bulls, the above are all good heads for Central Provinces bison. The longest horns shot by me were 29½ inches, the widest span of this head is 33 inches, and 18 inches round the base. The thickest horn I have measured, was 19 inches round the base. It should be remembered that the measurement round the base of the horn is more when the animal is just dead, than after the head has been thoroughly cleaned and got quite dry; there is a good deal of fleshy matter between the horn and the bony core, when this is removed, and the horn gets dry, the base of the

horn shrinks. All the above measurements are from dry heads. The measurement round the base of the horn would be about an inch more in each case when the animal was killed. The horns of the cow bison are much smaller and thinner than the bulls, and they have a narrower sweep of horn. The tips of their horns curve in sometimes very close together. I have a photo. of an ordinary cow and a malformed cow's head; they are numbered 6 and 7. The latter head is a very curious one, the bony core is only a few inches long, and does not extend up the horn as usual. The measurements of the malformed head are—Widest span, 33; length, 22; between points, 26. The head of a bull procured from Travancore in the possession of this Society measures—Widest span, 43; length, right horn, 31½; left horn, 30½; between points, 29; round base, 18; vertical height of horns above skull, 12½.

It would be hard to get a better one. It is No. 8 in photo., and is taken on a larger scale than the photo. of the other heads.

Bison are essentially a mountain animal, though they will often be found in the low jungle in the proximity of hills; they go in herds varying in size generally from 20 to half a dozen. The old bulls lead a solitary life. I have only once seen a young bull by himself, but two young bulls together are common; they are generally not worth shooting. A cow is sometimes seen alone with her calf, the latter being a few months old. Large herds of cows and calves without any bull at all, and herds without a good bull, are common. Sometimes an old bull, which according to custom ought to be solitary, is found with a herd, especially if the herd is a large one. Mr. Sanderson says he has never found a really aged bull with a herd. I have shot very old black bulls with rugged heads out of herds. Head No. 4 is an instance in point, and the biggest one I ever saw was in a large herd. No doubt old bulls are generally solitary. A solitary bull has always a good head, so you may be sure when you get on his tracks that he is worth powder and ball. The points of an old bull's horns are invariably worn, broken and blunted at the points. The horn, however, grows again and makes a fresh point in the middle of the blunt end; see heads Nos. 1, 2 and 4. The calves in my opinion are born at all times of the year, though it is said that most are born about the end of the rains. I have seen young ones of a few days old in May and June, and the calves one sees then appear to be of all ages. I was once in the beginning of June tracking a herd, and came on a calf crouched in the long grass. The mother

had gone on with the herd and left the calf concealed behind. It was sitting with its head and neck stretched out close to the ground, trying to make itself as invisible as possible. I succeeded in taking a photo. of it at a distance of 3 yards: all the time I was fixing the camera, it kept its eyes on me. On my moving the camera to take a second picture from another position, it got up and bolted, and seemed to be a fortnight old. It was of a light yellow colour, and exactly the same colour as a calf of the American bison I saw in the London Zoological Gardens last year, which the keeper told me was then a fortnight old. I then continued tracking the herd, and saw the calf again two or three times until I passed it in some long grass. Whether by accident or instinct it followed the tracks of the herd. The end of it was that the herd after a circuit of a couple of miles returned to the place where the calf had been left sitting, but I did not fire at them, as there was no good bull. Bison never leave the jungle, and are impatient of civilization. They do not mind the few huts dignified by the name of villages that are to be found in the forests. I have often found their tracks within half a mile of such spots; they are naturally timid and flee from the sight of man. In my opinion they are not at all dangerous game. The ground one attacks them on is well wooded and affords every facility to the hunter for dodging them, should they charge. This, however, they seldom do. I have only been charged myself thrice, once by an old solitary bull that I had wounded the day before—once by a bull in a herd that was so badly hit he had no other means of escape, and I was close on him, and once by a cow with a young calf. The last two instances ought not to count, for

"The smallest worm will turn being trodden on
And doves will peck in safeguard of their brood."

My brother was charged by the first bull he ever saw. It tossed his shikari, the point of the horn scratched the skin on the inside of the thigh. The man fortunately fell into the bottom of a nullah, the bull did not go on, but stopped looking about for his adversary, and was then killed. The shikari though not hurt said he had had enough of bison shooting and would go home. The natives show considerable fear of bison, and give them a worse character than they deserve. An old bull I once shot I was told had killed a native a short time before. When a bison charges he commences by running at you with his head well up, and nose in the air, and only tucks his head down when a few yards off. At least

that was the way the ones that charged me behaved, but the instances are too few to generalize from. I only once found two old bulls together. When the largest received my fire, he rushed at the other one and they began butting each other like a pair of billy goats. On my running up and firing the second barrel, they made off, and I eventually bagged the one I fired at. The second one left the wounded one immediately and went in a different direction. The bull that chargod my brother came on with a series of snorts; the others were silent when charging. A herd never charges; on one occasion a herd of over twenty when I fired came in a compact mass straight for me. I had to fire the second barrel into the brown of them when ten yards off. They opened out and passed close on each side; the last one, a good-sized bull, nearly ran over me, but on my shouting at him he shied violently to one side. This herd had not the slightest intention of charging, but were merely bolting. They were down in the bottom of a nullah at a waterhole, and when I fired fled out by the path they had taken down, and as I had tracked them to the spot, I was right in their way. I found the next day, some miles off, a cow with a broken shoulder, the result of my shot into the brown. The bone must have given way after some time, as there was no sign of any wounded one at the time. The bull, I first fired at, I never bagged, though I saw the bullet hole, from a 12 bore, behind the shoulder, though too high. I do not think bison drink every day. A solitary bull I followed for three days, and that I wounded the first day, did not go to water that night, or on the second day at all, as I was on his tracks the whole time, and saw him at sunset of the second day. I am sure of this. He drank on the morning of the third day. I was two and a half hours after him the first day, eleven hours on the second day, and ten hours on the third day, twenty-three hours and a half in all steady tracking. On the afternoon of the second day he went back over exactly the same ground he had come the first day. For several miles he took almost the identical old route, descending the nullahs at the same spot, and at sunset I saw him within a few hundred yards of where I had first fired at him, 26 hours before. This seems to show that a bison frequents a particular jungle. On the third day he went straight away for several miles in a different direction. I ought to have got him, but did not. I was several times close to him in long grass, but he only once made any attempt to show fight, and then sheered off on

being fired at without charging. Bison generally lie down about 10 a.m., but sometimes they do not appear to lie down at all, especially if the day is cloudy. I have seen them grazing at all hours of the day. I have found them at water in the morning, middle of the day, and afternoon; though they usually drink in the evening or early morning, I have tracked both herds and solitary bulls from early morning, and only came up to them late in the afternoon and found they had never lain down, though this is not common. There is nothing that teaches you the habits of animals better than wandering through the jungles stalking. If you keep your eyes open, you get a good knowledge of the favourite haunts of tigers, panthers and bears, which you can turn to good account in future years; but when stalking, I think it is advisable to stick to it. If you are after tigers leave stalking, except perhaps an occasional day, alone. Moreover, in the extensive jungles which bison love, although there are plenty of game killing tigers, &c., they are more difficult to come to terms with, than the cattle killers on the borders of cultivation, where you will not find bison. One of the charms of bison stalking is that you frequently come across sambur, cheetul and in the sal forests swamp deer and occasionally larger game, and can without detriment to your sport fire at anything you feel inclined to. In my opinion a bison is not disturbed by a shot unless fired within half a mile of him, and if he is alarmed by a distant shot, he does not go very far. In the hot weather most of the stags have shed their horns, but a small number still carry their heads. When tracking bison I always fire at a good stag, if I come across one. The small four-horned antelope you can also knock over, and keep yourself pretty well supplied with fresh meat. It is good practice to shoot them running. Bears are often seen in the early morning and in the evening among the bison hills. I have shot more than half-a-dozen when stalking; once I bagged a tiger, and have seen others, and have also had shots at panther. Pig and neilgai you will also see, but it is no use firing at them. The ground is generally quite unrideable. You cannot afford to run the risk of laming your horse. I once speared an old boar the same morning I shot a bison, but he got away into a steep ravine on the edge of which I speared him. In the sal forests bison and buffalo are found on the same ground. I have shot both on the same day. Such red letter days are few and far between, and there are many blank days on which you see nothing. I have been ten days out from morning to night without a shot, although I might have had two or three shots

at small bulls, had I wished, so you must not run away with the idea that you have only to walk into the jungles and shoot. A great deal of hard work and perseverance is required before you lay the bison low; but there is always a pleasure in the pathless woods which never palls, even though the silence is not broken by the crack of your rifle. You require to make little or no arrangements when you go stalking; I always take a small tent, though it is quite useless. Unless it rains, I never go into it. It is much cooler under a tree. The less following you have and the smaller you can make your camp the better; the jungle villages are small, the belongings of its few inhabitants are not sufficient to cope with the demands of a large camp. They have only enough for their own needs, and they do not care to sell you what they want for their own use. They are very obliging, and will do what they can for you in the way of milk, &c., but the way to be popular and get sport is to interfere with them as little as possible. You do not want shikaries. Every jungle man is a born tracker. If a man likes to come with me I do not object, but as a rule the native has an unconquerable aversion to leaving his lares and penates, so you get fresh men at every camp. For anxiety to please you, hard work, endurance, and cheerful interest in your sport, the simple native of the jungle takes the first prize. Many of them are thoroughly imbued with the sporting instinct, though they never can understand why you do not fire at does and cows. A doe sambur they consider excellent material to fill their stomachs with, and when they see a prospective dinner cantering off unharmed they are much disgusted. This is their only failing. It is a mistake to get up before sunrise, the day is quite long enough if you get up with the sun, at about 5-30 a.m. Having taken a cup of tea or coffee, and a basin of porridge and milk, you ought to be under weigh at 6-30 a.m. Take plenty of water with you, as under a hot sun, when the water is finished, you are soon *hors de combat*. Each of your men will carry his own water gourd, but it is advisable to take for the men a couple of chatties full of water which one man can carry slung to each end of a bamboo There is generally a great scarcity of water in bison ground, the water holes being few and far between, the animals wander miles from water, and you may not see any water all day. I always have two large chaguls full of water carried for myself, and have sometimes found I had an insufficient supply. It is important to see to the supply for your men, as they knock up very soon when the water is done. You will want little to eat

during the day. Under a burning sun one has no appetite for dry food like cold venison or a tough fowl. Biscuits are an abomination Cold bison tongue is juicy and good, so are tinned sausages, and sheep's tongue. Preserved green ginger is a great pick-me-up, and I always take some with me. Pickled white onions are also a stand-by. These will be carried in a large leather bag which will also hold your skinning knives, tobacco, reserve of cartridges, and any other little things you may fancy you want. Never carry a knife on your belt; it is quite useless. I always carry my field glasses on my belt and not slung over the shoulder They are then always at hand, and you can drop them back into their case in a moment. Half-a-dozen cartridges on the belt, and as many more in your pocket will be enough. A reserve of another dozen should be in the bag. Thus accoutred you will sally forth on horseback, accompaned by half-a-dozen men, of whom two will carry the water, one your bag, one the camera and two your battery. You will first have a look at the water hole near your camp (for you always camp near water), and if there are no tracks there, you will leisurely proceed through the jungle to the next water, which is perhaps several miles off. One man, carrying your Express rifle ready loaded, will walk immediately in front of your horse, the others behind. You may very likely put up or sight a stag or four-horned antelope, and can at once dismount and fire, or take a shot, which is generally unsuccessful, from horseback. As you proceed you keep a sharp look out for deer and for tracks, and are often disappointed by finding what at first sight appear to be fresh tracks turn out to be a day too old. You may wander about in this way all day and see neither hoof nor horn or animal of any description. The jungle man with subtle flattery will account for this by telling you that having heard your Honour's name they have fled. On other days you will see stags that have shed their horns or small parcels of hinds, or get on the tracks of a herd that after hours of tracking you get up to only to find that there is no head worth shooting in the herd; but at last the fresh print of a gigantic solitary bull will gladden your eyes, and in that case, if it is not too late in the day to come up with him, it is your own fault if you do not bring him to book. With a little practice the track of the day is easily distinguishable from the track of the day before. Where the ground is bare it is as hard as iron, but there is always a layer of dust on it which takes a clear impression of the foot; in the middle there is a slight ridge of dust pinched up

by the cleft in the bison's hoof. If this is sharp, and the whole impression is clean looking, it is a fresh track. If a footprint has a blurred appearance, and the edges not clearly defined, has tracks of insects across it, or in short has a dirty appearance, it is an old one. If you point to a track and ask your men if it is to-day's; when it is an old one their reply always is "maila hai," it is dirty; and I know no better description of the difference between a fresh and old track than the one is clean and the other dirty looking. On softer ground the difference is easily distinguished. In long grass I for one cannot distinguish between a one day old and a hour's old track, without following it for a little way, when other signs, such as the withered or fresh appearance of the ends of grass dropped out of the bison's mouth when feeding, &c., soon let you know what sort of track you are on; the alternations of hope and despair when you are on a doubtful track, and see or fancy you see signs that you are all right, and again see signs which lead to a contrary conclusion, can be imagined but cannot be described. Half a mile's tracking ought to solve the question. If there has been dew during the night, you will in the early morning find a drop at the end of each blade of young grass where it has has been cropped if the track is a day or more old. I will suppose however you have found a fresh track. You will at once begin to hope that the next hundred yards will bring you in sight, and although you know from experience that probably many miles have to be traversed before you come up to your game, you can never get rid of the idea that you will see him in the next ten minutes, so that however long the pursuit, there is no weariness in it. As tracking is half the fun, you should track yourself, but good at tracking as you may become, or good as you may fancy yourself, you will never equal your humble companions at this. After some hours' tracking the glare is rather trying to the eyes but they soon get used to it. You do not go very fast when tracking, and you have plenty of time for looking about you and ahead. Taking every thing into account, and including short stoppages, I do not think the average pace of tracking is more than 1 to 1½ miles an hour. Though some bits are done at twice that pace, at other times you can only follow the track with difficulty or lose it altogether for a time. Should you lose the track, make a cast forward while your men try and puzzle it out. A bison generally goes by the easiest way in crossing hills, a knowledge of which fact often assists you in recovering the trail. Two men only should be with

you, and you should always carry the rifle yourself. The rest with your horse will follow on the tracks on their own account 3 or 400 yards behind. The water man, however, I keep within 100 yards, as you constantly want to have a suck at the water. It is impossible to know when you will come up with the bison, even when the tracks are quite fresh, and they are apparently not more than a few minutes or half an hour ahead; they may keep walking on for hours as fast or faster than you track; on the other hand, although the signs on the spot you have reached show that it must be some hours since they passed, they may have lain down a short distance in front, and may be close at hand. Every two or three hours it is pleasant to sit down for a few minutes in the shade and have a smoke, but the ardour of the chase soon drives you on, till suddenly a loud snort and a rush announces that the bison have seen you first and are off. If you can make out a good bull, and he is broadside on, take him running, and if he is within a 100 yards you ought to kill him. If his stern is to you do not fire. Unless the jungle is pretty open, it is not easy to make out the bull. Never fire a chance shot, which can only result in some wretched rubbish of a young bull or worse still a cow being hit. If you do not fire you continue tracking, and you may be sure as a rule two or three hours will elapse before you see them again. The tracking will be easy for a mile or two while the herd has been galloping. They then pull up and go on a steady walk for miles, and your chances of a shot are much less now than when you began, as they are on the look out and difficult to approach. They sometimes sit down again if the day is very hot; on a cloudy day they go much further. A solitary bull when disturbed by seeing you does not go so far as a herd will before stopping; he too will sit down again on a hot day. If bison have not seen you but only winded you, they stop sooner. If you fire at them it is no use going after them any more, as they will usually go many miles before stopping, and the day is too short to come up to them again. If, however, the bison are not lying in long grass, you ought to see them first: a herd will be found sometimes standing, sometimes lying down; your attention most likely is first attracted to them by the flap of a ear or the moving of a tail. It is astonishing how the least thing moving in the jungle attracts the eye. They will probably be about 200 or 300 yards off, as you cannot see very much further in jungle. I have generally found them easy to stalk, the only difficulty being to find the bull

and get to him without being seen by the others. A solitary bull is quite easy to stalk if he has not seen you. According to my experience their eyesight is more to be feared than their nose. Capt. Forsyth expresses the contrary opinion. The air is frequently quite still, and the grass and trees I think diffuse and dissipate the taint your presence gives the wind in a much shorter distance than would be the case in open ground. Even if you are tracking down wind they seldom bolt till you are within 3 or 400 yards, and you generally hear them making off. The best way of finding out from what direction the little wind there is is coming from, is to lick the palm of your hand, and turn it slowly round; a cold feeling will strike it directly it meets the wind. Of course if there is a nullah or any large rocks which will conceal you, take advantage of them. If not it is a mistake to crouch; remain erect with the arms close to the body and the legs close together, and stand perfectly still if the bison turns his head towards you. It is of the utmost importance to keep the arms close to the body and the legs close together, when advancing or standing. All sudden movements should be avoided. If a bison looks up at you when you are stalking him you must remain absolutely motionless in whatever attitude you happen to be. An irresistible longing to scratch my nose always seizes me on these occasions. If he is unsuspicious you advance slowly, keeping a tree if possible between you and his head. You should always make the stalk alone. A native always points to the nearest animal, whether cow or not, as the largest bull that ever was seen, and he gets nervous at close quarters. Never circle round bison when in sight of them, but go straight in. If there is a better approach from another quarter retreat till you are out of sight and then go round. If you are a moderately good stalker you can easily get within 100 yards, but the surest shots are made by getting as close as you can, and you should therefore go on without firing as long as the bull remains unsuspicious. I have more than once got within ten yards of bulls lying down, and generally get within 50 yards of a solitary bull. Herds are not so easily approached within 50 yards, but you can almost always get within 100 yards. Bison are easily killed with a single ball if hit in the right place; for a broadside shot fire low down behind the elbow, or high up just below the backbone, where the dorsal ridge terminates, or through the centre of the neck. One shot from an Express rifle in any of these spots is enough. Opinions differ as to the best rifle. I began with a 12-

bore rifle, firing 4½ drams of powder, and found it did its work well. I then tried an 8-bore gun with 9 drams, which was good too, and of late years I have shot with a 500 Express with a solid steel plug in a leaden bullet in place of the ordinary copper tube in a hardened bullet. The steel plug bullet expands as well as the usual bullet, but has greater penetration. I prefer the Express for the first shot at a bison; if properly placed it kills at once. To follow a wounded bull into long grass or thick jungle I prefer the 8-bore. The ordinary Express bullet, as also the steel plug one, penetrates the skull easily. The Express is no use in my opinion for the chest shot, or for firing at the stern. The 8-bore will drive the ball through the chest into the lungs. I also with this weapon twice killed bison at close quarters with a raking shot through the stern into the body. This shot should not be taken with a less powerful gun. Neither the 8-bore nor 12-bore will drive the ball right through a large bull broadside, as the ball is stopped by the skin on the opposite side. The ball should be spherical and hardened, twelve parts of lead to one of tin. The head shot should be high, on a line with the root of the horn; between the eyes is too low for the brains if the forehead is at right angles with the gun. Head No. 3 has the bullet hole in the right spot. Owing to their habit of poking their noses high into the air when they see you, it is not easy to get the right angle into the brain, and it is not a shot to take except as the *coup de grace* to a wounded animal. Every sportsman should make a point of studying the interior economy of the animal he shoots. This can best be done by ocular inspection. Cut the animal open and examine the cavity of the chest and the cavity of the stomach. You will be surprised to find what a lot of space there is where a bullet would do little immediate damage. The bisons' stomachs have each a moderate sized haystack in them, which it is worse than useless to perforate with a bullet. The lungs in my opinion afford the best mark, and a shot there is certain death in a few seconds. If a bison is standing when fired at, he seldom drops to the shot behind the shoulder, but gallops from 50 to 200 yards before dropping dead. If he is galloping the same shot drops him dead on the spot. Why this should be I do not know, but so it is. When you have killed him you will find the old bulls almost hairless; their skin exudes a thick oily substance which you can scrape off with a knife. It looks like dirty oil. Mr. Sanderson says that the hide of an old bull after a sharp hunt gives out an oily sweat. He adds: "In this peculiarity the bison differs from domestic cattle which never sweat

under any exertion." In this I think he is mistaken. This oily sweat is natural and not the result of exertion. I remember shooting an old bull at 8 a.m. that jumped up close to my horse; it did not go 100 yards, its skin glistened with this oily exudation; and I have killed others though after the day had got hot, that had undergone no exertion, in a similar state. If you pass your hand along the hide of a younger brown bull it will become quite greasy, though you cannot see the moisture as you can on an old hairless bull. Shortly after death if the bison has been drinking recently the water runs out of his mouth and forms a nasty puddle. He is generally infested with large ticks on the inside of the thighs, so it is as well not to sit triumphant on his carcase. His tail makes excellent soup; the tongue is very good fresh, and would probably be better salted. The flesh of an old bull is to my mind tough and tasteless; the marrow is too large and rich. The gall bladder will sometimes be taken by your men. On my asking what the use of it was, they informed me that the contents rubbed on the noses of young dogs made the dogs very keen of scent in hunting deer and pig. In most places your men will not eat the flesh of the bison. Where they do they cut the meat into long strips and dry the flesh in the sun; the hides are sometimes taken by them and utilized as a covering to the roof of their huts. The bison in uttering its snort of alarm expels the air with great force from his nostrils, and according to Dr. Francis Day, in his account of Cochin, the natives there assert that it will root up a stone from the ground and discharge it with a snort with fatal effect at his adversary—an idea which, though of course fanciful, might readily occur to one. Bison are often blundered on as one stalks though the jungle, and a head procured with little or no trouble. You do not look with so much satisfaction on such a head as you do on one that you have tracked for many miles. Bison will on such occasions stand and stare at your horse, regardless of the men accompanying you, giving you time to dismount and shoot them. On two occasions I rode almost on to bulls before they rose from their lair in the grass. They stood staring at the horse only a few yards off, and made threatening demonstrations with their horns, but did not charge. Some of the solitary bulls have no doubt been expelled from the herds after a tough fight: one I killed was covered with a number of wounds quite fresh, inflicted by the horns of a rival, but I think most of them lead solitary lives from choice. They appear to be too big and powerful to have been licked by

the smaller herd bull, unless it be that their horns being blunt and broken, are not a match for the sharp points of the horns of the younger and lighter bull, or it may be that they find in solitude a calm unattainable in the bosom of their families. I have never found a solitary bull bison join a herd when tracking him, though aged buffalo bulls often do. The bison is known among natives throughout the Central Provinces as the Gour. Capt. Forsyth says that the name "Gour" is unknown in Central India, and that he is called Bhinsa or Bun Bhinsa. This is certainly contrary to my experience, and I have shot in the same jungles as Forsyth did. I have heard him sometimes called Bun Bhins, but not often. The latter term is used by the natives for buffalo. It is pronounced through the nose, Bun Bise. The bison, like all the true ruminants, chews the cud by a circular motion of the jaws from right to left or from left to right, and not alternately from left to right and then right to left. If you get close enough you can see the cud passing up his throat into his mouth to be chewed in the shape of a ball just as you can in a common cow. The camel chews the cud with alternate bites from left to right and then right to left. I believe the rest of the camel tribe do the same. I intended to have looked at the llama the last time I was in the London Zoological Gardens to see, but my companion, no less a personage than our Chief Magistrate, Mr. C. P. Cooper, displayed no interest in such details, and insisted on going off to lunch and chewing the cud on his own account. Bison have never been reared in captivity. If caught as calves they soon die. There is an animal called the Gayal or Mithun (*Gavæus frontalis*) found to the east of the Brahmapootra, that is stated by Jerdon and other authorities to be easily domesticated. There is a large bull in the London Zoological Gardens, the only one I have seen; it is very like the bison and might be easily mistaken for one. The only difference I could see was that the horns grew out almost straight with little curve, and were rather flatter in shape. The one in London is an old bull, quite black. The colour, white stockings, dorsal ridge, head, &c., are exactly like the bison. His hoofs, owing to not getting sufficient exercise to wear down the new growth, are much mis-shapen. I do not think there is any fear of bison being exterminated. Shooting the old bulls does no harm. The young bulls should be spared, as it takes time to grow a good head. When you first begin shooting them, you will probably shoot a cow or two, as it is difficult for an inexperienced eye to distinguish

them from the bulls, and you will mistake a cow for a bull, but one or two misadventures of this kind will disgust you, and you will be more careful and learn what a really good bull is. The natives occasionally kill them with a poisoned arrow, but they seldom shikar them. Tigers seldom kill them. I only know of one instance. Foot and mouth disease and other epidemics destroy large numbers. Within the last ten years there were bison in Salsette within 30 miles of Bombay. I believe there are none there now. I was told the last herd had died of cattle disease. They were formerly plentiful in the ghats near Khandalla. I have in my possession at home the head of a very fine bull (the measurements I have not got by me), the last one killed some 38 years ago at the foot of the ghats below Khandalla. As long as the highlands of Central India and the enormous tracts of hill and jungle in Southern India exist, I have no doubt that bison will give sport to our successors long after we have gone to the happy hunting grounds. When you have secured your trophy, if you do not take care, the horns will be spoilt by a small kind of caterpillar or grub. It is white in colour and has a large head. It bores a cylindrical hole from the inside of the horn to the surface, and in the hole thus made spins a cocoon, emerging ultimately in what looks like a beetle. It spins very rapidly. I have watched them at work. They begin to spin at the surface of the horn; if you destroy their work, the top of the hole will be covered again in half a minute. The best preventive is to remove the horn from the bony core, but you cannot always get an old bull's horns off. In that case pour boiling water or kerosine oil down between the horn and core. I have never tried beating for bison, and should think it was poor sport. Find the tracks yourself, track him yourself for miles, and kill him with a single bullet in a fair stalk, and the incidents of the day will never fade from your memory.

MISCELLANEOUS NOTES.

1.—BELIEF IN THE BIS-COBRA.

My servant came running this morning to say that there was a large bis-cobra in a shesum tree just outside the house. All hands assembled at a respectful distance from the tree and evidently were very jumpy. Going close, I found a largish Monitor on one of the boughs trying to get away from a squirrel.

When the squirrel came to close quarters the lizard snapped at him, but the little fellow was much too quick for him, jumping back or round the bough, and then tackling the Monitor from another quarter. At last the latter gave in and came down the tree pursued by the squirrel with tail erect and hair frilled out in great triumph. The Monitor ran into the grass, where my terrier settled accounts with him forthwith, greatly to the sweeper's horror, who thought it was all up with "Tim, Tim." It is curious that here in the North-West Provinces the appearance of one of these monitors causes more dismay among the natives than any Krait or Cobra.* One of my men assured me he had known a woman who died from the bite of a bis-cobra.

G. J. RAYMENT.

Babugarh, September, 1889.

2.—THE WATER RAIL (*RALLUS AQUATICUS*).

I WRITE to inform you that I killed a specimen of the Water Rail (*Rallus aquaticus*) in the Bohri Taluka of Shikarpur, Collectorate of Sind, on 5th November. Hume and Marshall describe it as extremely rare, and only known to them as having been seen in the Dun, with the exception of two specimens, one of which was killed near Sialkote and the other near Abbotabad. I have carefully examined the bird, and it is undoubtedly *Rullus aquaticus* and not *Rallus indicus*, the distinctive points being unmistakable.

D. GEORGE.

Sukkur, 6th November 1889.

3.—HOW A SNAKE CLIMBS.

A SPECIMEN of *Lycodon aulicus* was killed yesterday in my house while climbing up a bamboo blind (chick) stretched vertically and lashed in position. I saw the operation myself. The snake evidently climbed by hitching the edges of the ventral shields on to those of the bamboo lattice of the blind, and not by winding his body, which was entirely on the side of the blind next to me, round the bamboos. He moved slowly and not painfully or awkardly. This species of snake is notoriously apt at escalade, but this is the best thing in that way I have seen of it.

W. F. SINCLAIR.

Alibag, September 1889.

* It is exceedingly difficult to account for the widespread belief, amongst the natives of India, in the so-called "Bis-Cobra." The young of the Common Indian Monitor (*Varanus dracœna*) is greatly dreaded in most parts of the Bombay Presidency, although, curiously enough, when the lizard becomes full grown, it is called the "Ghorpad," and is recognized by the country people as being perfectly harmless. The young differ considerably from the adult, in having a mottled appearance. Many other equally harmless lizards are thought to be exceedingly poisonous by the natives in other parts of the country, where the term Bis-Cobra is applied to them *Vide* Mr. Vidal's interesting paper on the subject on page 71 in Vol. 3 of the Society's Journal.—ED.

4.—BATTLE BETWEEN BEES AND WASPS.

I saw in the *Pioneer* a few days ago an account of a battle of butterflies, which occurred in Japan, and as I the other day witnessed a battle between some large wasps and the large jungle bees, I thought it might interest you to hear about it. Close to my bungalow there is a ravine, in which there is a small forest of hill oaks. On these a swarm of large bees evidently intended to settle, and they were buzzing around, when first one, and then a few more, and at last a large number of these wasps (a specimen of which I send you*) appeared on the scene, and then commenced the battle. The noise of the combatants was very loud, and the bees were desperately angry, and although I was but a silent spectator, attacked me, causing me to retire. I crawled up, however, after a while and watched proceedings. A wasp would suddenly come across a bee, or *vice versâ*, and after gyrating round one another for a second or two, they closed and came tumbling down to the ground; then, as it evidently happened as far I personally saw, the wasp was the victor, and clutching his victim in his arms, he flew away with him, and on my telling the story to some of the hillmen, they said that the wasps ate the bees. The battle started about 9 A.M. and lasted till sunset. Next morning both wasps and bees had disappeared. Perhaps there are members of your Society who may have witnessed similar occurrences, and it would be very interesting to hear about them.

H. W. HEWETT.

Almorah, Kumaon, 13th October 1889.

5.—MAN-EATING TIGERS.

Adverting to Mr. Gilbert's interesting notes on Man-eating Tigers read before the Society in September last, I should like to point out that I do not think it is the general belief at all that all man-eaters are old and mangy animals. But the converse appears to be the rule, that when a tiger does get old and mangy, or is suffering from a broken limb, so that it is not quick enough to catch its usual prey, it then takes to feeding on the easiest of all prey to secure, *viz.*, on man, and this view is borne out by Jerdon. One point, which I do not think Mr. Gilbert mentioned, was the curious fact that there are more man-eating tigresses than tigers. As a reason for this I would suggest that it may be that the tigress, with two or perhaps three cubs, finds considerable difficulty in keeping her larder well stocked. Game in some parts being scarce and exceedingly wide-awake, she therefore kills the first thing she comes across; and having once begun man-eating, all authorities agree that they never reform. In the last part of Mr. Gilbert's narrative of the Bansda man-eater, he says that as there were no more deaths in that part of the country, there was little doubt that he had killed the man-eater. But how about Mr. Crawley-Boevey's tigress? This, they say, also died, and there are, I think, more man-eating females than males; the Dewan of Bansda seems, however, to have been satisfied that Mr. Gilbert's was the right one. Mr. Gilbert also mentions that tigers do not kill goats. Whether they do or not I am not able to say, but his Bansda man-eater is credited with seventeen, according to the statement of the Dewan.

W. St. JOHN RICHARDSON,
Capt., B. S. C.

* *Vespa magnifica.*—Ed.

6.—A WHISTLING BULBUL.

In my last communication I introduced the Madras Bulbul (*Pycnonotus hæmorrhous*) as a talking bird, and have now to record him as a whistler, for he seems to be as apt at whistling as at talking. A lady who in her quiet way takes notice of everything around her, tells me that she had one of these birds that could whistle the "Quaker's Wife" to perfection, and often from the rails in her garden it would pour forth its strains so perfectly distinct and natural that she frequently believed that it was some one outside "whistling for want of thought," and not till she actually saw the bird so engaged was she convinced that it was capable of the feat. After exhibition of such capacity, the bird should be welcome wherever pet and pupil are appreciated.

A. W. MORRIS.

Yercaud, November 1889.

7.—THE DAYAL BIRD AS IMITATOR.

Copsychus saularis is another bird that is as pugnacious as a gamecock, and I remember having read somewhere that it is trained for fighting purposes by some of the natives of this country, but it has a sweet voice into the bargain, and is held i nsome esteem as a cage bird in this land, where songsters are so few. I was not aware, however, that it had an imitative faculty, and am indebted to the same lady who informed me about the Whistling Bulbul for the knowledge. One of these birds that seemed to have taken more than a passing notice of a canary's song learned to imitate it so perfectly that the lady in question was often puzzled to know whose canary it was singing outside, till one day she found out that it was a Dayal Bird that had taken the notes of her pet unto himself. Perched on a tree outside it would imitate a canary so perfectly that it was hard to tell it was not this hird singing.

A. W. MORRIS.

8.—A PET DRONGO.

I have reared many a feathered pet, but in no instance did the loss of any of them occasion me such keen regret as the death of a pet Drongo (*Buchanga cœrulescens*), which fell a victim to its overtrust and confidence in its human master. I had reared it from a little thing, and when fully fledged and able to take care of itself, often, at my call—a whistle imitating its note—it would come and perch on my hand or shoulder though it would not allow itself to be caressed, a proceeding which all birds seem to object to. That the bird somehow knew me and the members of my family was apparent, for often when out either riding or walking, I would suddenly find it alighting on me, no matter how far from home, a thing it would never do to an outsider. Did any stranger come in the bird was immediately on the defensive and permitted no familiarity. A curious instance of its antipathy to strangers and its loyal attachment to its protector was exhibited one day. A member of the family going into Capt. P.———'s found the bird alighting on him just as he entered the bungalow, and was deliberating whether he should put the intruder outside, when he heard the Captain's voice calling to him to come in. At the same time he advanced with hand outstretched to greet his visitor, when the bird, evidently thinking that an assault was meant,

flew full in his face and beat off the astonished soldier. It used to be my great amusement, on going through the grounds, to whistle for the bird, at the same time extending my hand for it to perch on, and having "fixed" a gamy grasshopper to walk towards it. when away it would go and the bird would have it in the twinkling of an eye, a species of hawking I much enjoyed.

And now for the sad part of the story. When out shooting miles from home my poor bird, as I subsequently found out (though at the time I had my doubts about its being a wild bird), in an evil moment perched in a tree overhead, and being mischievously inclined at the moment, I fired and brought down my pet Drongo, a circumstance I cannot cease regretting even to this day as an ending to so much attachment.

A. W. MORRIS.

9.—MIMICRY FOR PROTECTION AND FROM EXAMPLE.

It has lately struck me that though generally speaking the term *mimic* is applied to birds and insects that resemble or imitate other animals, either in voice, colour or style of marking, zoologically regarded it needs restrictions. To use one term to denote a multiplicity of manners and ways is to use it laxly, and Professor Meldola, after whom zoologists are inclined to follow, aware that the word *mimic* has been rather loosely applied, suggested that "the terms *protective resemblance* should be applied to the appearances which tend to deceive enemies by their resemblance to motionless (vegetable or mineral) surroundings, the term "mimicry" denoting the resemblance to other animals." I would therefore suggest that while *mimic* be employed for butterflies, beetles and other insects that either for protection or some other cause take on the appearance of well protected forms, *imitation* be applied to such animals as *copy or voluntarily assume* the peculiarities of other creatures. Superficially regarded there is hardly any difference between the words suggested, and yet these hardly perceptible shades of difference add greatly to the perspicuity of meaning. If these be accepted, then *mimicry* would be the result of an involuntary assumption, while *imitation* would be a voluntary production, or, in other words, that it would arise from protective causes, this for example. Thus we should say the female of *H. missippus* "mimics" *L. chrysippus*; the above case of *C. saularis* would be one of "imitation," and such insects as *Phasma*, *Mantis* and the larvæ of many Lepidoptera would assume what Professor Meldola calls *protective resemblance*, *i.e.*, resembling the leaves and twigs of trees, stones, earth, seeds, &c.

A. W. MORRIS.

10.—USES OF THE SCREW PALM (*PANDANUS ODORATISSIMUS*), KEVADA, केवडा.

In Part 2 of Vol. I. of our Society's Journal there is a paper on the uses of the Screw Palm taken from the journals of the late Mr. Handley Sterndale and read by Mr. R. A. Sterndale on the 7th December 1885, and also a note on the same paper by Dr. Kirtikar. In neither of these is there any mention made of a use to which the dried leaf of the *Pandanus* is put, which is to spread and polish the lac on children's toys, those bright and pretty lotas, humming tops, and so on,

made of wood and covered with brightly coloured lac, with which most of us are familiar. The lac is put on by closely pressing a stick of it, of the required colour, to the wood as it revolves in the lathe. When a sufficient quantity is taken on to the wood the *Pandanus* leaf, folded into a small cushion, is applied with some pressure, when the lac is spread and most beautifully polished.

J. A. BETHAM.

11.—MIMICRY IN BIRDS.

Referring to Mr. W. E. Hart's paper on two instances of Mimicry, it may perhaps be interesting to record in our Journal that there are quite a number of birds in this country in which the power of mimicing sounds has been curiously developed. Most of us know that the two Common Shrikes or Butcher Birds, *Lanius lahtora* and *L. erythronotus*, as well as the Indian Sky lark or *Chandul* (*Alauda gulgula*) are capital mimics. The Racket-tailed Drongo, *Bhimráj*, is also a splendid mimic, but it is a difficult bird to keep in captivity. I was once in the forests below Pachmarhi, and seeing some pea-fowl I tried to get near enough to get a shot at a fine male in full plumage. I had a Gond with me, so told him to wait below a rock while I went on, and that if I wanted him I would whistle for him. My stalk having failed, I whistled to my attendant and was immediately answered. I waited some time, but as my friend the Gond did not turn up, I whistled again and was again answered in exactly the same note. I waited a little longer and then went through the same performance with the same result, and as it appeared the Gond had either gone back or fallen asleep, I walked back to where I had left him and found him contentedly smoking. "Why did you not come when I whistled?" said I. "Oh," he replied, "was it is you that whistled? I thought it was that bird up there," and he pointed upwards at a racket-tailed Drongo high in the tree overhead. I tried the bird again, several times with notes whistled in several different tones, and was exactly answered by the bird. The imitation was exact and given back as any human being could have done it. At first when I found out the deception I felt as if I could have made a specimen of Mr. Drongo, but kinder feelings prevailed and I let him go. On mentioning this to some friends a few days afterwards, a lady told me that she had possessed more than one *Bhimraj*, and that they were extremely clever at imitating sounds, straight off, as do Parrots or the Black Hill Mynas. She told me they were were difficult birds to keep in captivity, but that they became very tame and interesting pets.

J. A. BETHAM.

12.—*PAPILIO POLYMNESTOR, P. DISSIMILIS* AND *P. PANOPE*

I. Referring to the note by Mr. W. F. Melvin regarding Mr. Aitken's statement the *P. Polymnestor* is unknown in Bombay, and possibly throughout the Konkan, I looked back at the passage and find that I have noted that it was frequently seen at Dapoli. I remember in my early days in India how the appearance of this butterfly in our garden used to cause a display of the liveliest interest, the younger members of the family rushing out to get a nearer view and possibly secure a good specimen. It was fond of hovering over the flowers of the *Lantana*, that bush with leaves that give out an odour of black-currants when bruised. Camp Dapoli is situated in the S. Konkan some 70 miles below Bombay.

II. The flight of *Papilio dissimilis* is remarkably strong when disturbed, and once it is frightened it goes away at a pace which defies pursuit; usually, however, it flaps along in a lazy sort of way, exactly resembling the butterflies it mimics, *D. limniace*. The flight of *P. panope* is the same, but it resembles *E. core* in coloration. Mr. Aitken in his interesting paper on the butterflies of Bombay, *vide* Vols. I. and II. of our Journal, says he has not seen the power of flight as mentioned by Distant. Both these butterflies (I think they are one and the same species) have a similar habit as those they mimic, they rest hanging at the extreme point of a naked twig, and would like to be passed over by the collector as ordinary *Danainæ*.

J. A. BETHAM.

13.—BEARS BEING EATEN BY TIGERS.

I GAVE a note on this subject in a recent number of the Journal.* Now I find in Captain Baldwin's "Large and Small Game of Bengal," 2nd edition, page 21, the following:—

"An extraordinary event happened while I was stationed at Jhansi. Our Brigadier, Col B———n (since dead, I regret to say), and one of his subalterns, C———é, were out together in the Seepree district tiger shooting. One morning they put up a large tiger and shot him. The beaters reported to them that they had come across the carcase of a bear, recently killed and half eaten, near the spot where they had put up the tiger just accounted for. The sportsmen examined the remains of the bear, and became convinced that the tiger had not only killed, but devoured the missing portion of poor 'Bhaloo.' To clear up all doubt they had the tiger opened, and portions of the bear's flesh were found in his stomach. This is the only instance of the kind that I have ever heard of."

H. LITTLEDALE.

Baroda, September 1889.

14.—MEASUREMENT OF INDIAN ELEPHANTS.

THE following measurement of two Elephants shot near here last year may be of interest, as they have not yet been published; and I am inclined to think that the tusks of the second animal have not been exceeded except by the 8 feet enormity from Assam:—

No. 1. Height. measured on ground, immediately after death, 9′ 8″.

Unbroken Tusk—Length, 5 feet; weight 56 lbs.

Broken Tusks, „ 4 „ „ 46 „

(Both tusks were cut out of the head at the junction with the skull.)

No. 2. Height, measured on ground between two upright bamboos placed at top of shoulder and sole of foot, slightly over 10 feet. (The forelegs were slightly drawn up and could not be pulled out straight.)

Circumference of forefoot	5′
Unbroken Tusks—	
Length	6′ 7″
Circumference at gum	1′ $4\frac{3}{4}$″
Circumference inside the gum ...	1 ′5″
Weight 3 days after death	65 lbs.

* *Vide* page 153, Vol. IV.

Broken Tusks—

Length	5 ′6″
Circumference at gum	1 ′4½″
Circumference inside the gum ...	1 ′4¾″
Weight, 3 days after death. ...	56 lbs.

CHARLES DALEY,
Asst. Engr., Bengal-Nagpur Railway.

Telaupali, Sambalpur viâ Raigarh,
September 1889.

15.—A BRANCHING ARECA-NUT PALM.

I HAVE to add to the accounts of branching Palms, formerly recorded in our Journal, the following note of a branching Areca-Nut Palm (*Areca catechu*) now standing in a garden at this place. It is said to be 10 years old, and is about 20 feet high. About 3 years ago it was attacked by a disease called "Bánd," which has killed many trees here, when the top almost died away, and has now been replaced by 15 to 18 distinct tops, growing in a flat close bundle in such a manner that one cannot count them accurately without climbing the tree. The whole tree has now the appearance of a gigantic housemaid's-broom, except that the "business end" is green and not yellow.

This case supports the theory put forward in this Journal that these abnormal branching palms are the result of injury to the trees.

It will be worth while to watch whether the branches mature. At present they are only in the green state, and it is likely that they will die off before they set into hard wood, but I have requested that the tree may be carefully preserved.

W. F. SINCLAIR,
Bo. C. S.

Camp Shriwardhan, Janjira State,
7th December 1889.

17.—MIMICRY IN CATERPILLARS.

I HAVE just read Mr. Hart's note, published in the last number of the Journal, on the Caterpillars which, as long as it is small, mimics the excrement of birds. I have frequently kept that species from egg to imago; all the butterflies I got were superficially alike, and I did not think of distinguishing males and females. But with reference to Mr. Hart's idea that the mimicry is to deceive birds, I have found that several birds will not eat that particular species of caterpillar, because of its evil smell, and, I presume, equally evil taste. The caterpillars are common during the rains on orange and pumelo trees, so now that Mr. Hart has raised questions many observations will probably be made.

BENJAMIN AITKEN.

Lucknow, September 1889.

PROCEEDINGS.

Proceedings of the September Meeting.

The usual monthly meeting of this Society took place on Wednesday, the 1st September 1889. Mr. J. D. Inverarity presided, a large number of members being present.

Mr. H. M. Phipson, the Honorary Secretary, acknowledged the following contributions to the Society's Museum :—

Contributions during August.

Contribution.	Description.	Contributor.
1 Crow's nest	Made of telegraph wire.....	Mr. S. Brooks.
1 Florican (alive).....	Sypheolides anrita	Dr. D. MacDonald.
Fossils of Leaves	From the Nerbudda, near Jubbulpore.	Mr. R. P. W. Strong.
1 Chameleon.....	Chamelco vulgaris	Mr. W. S. Threlfall.
1 Lizard	Lygosoma punctatum.....	Dr. Brown.
A quantity of Sea Snakes, Fish, and Shells.	From Alibag	Mr. W. F. Sinclair, C.S.
A quantity of Turtle Eggs.	Chelonia viridis	Do.
3 Cobras (alive)	Naga tripudians, from Deoli.	Mr. Sutton Jones.
1 Dugong	Halicore dugong, from Aden.	Dr. Monks.
1 Manura	Paradoxurus musanga	Mr. H. R. Cooke, C.S.
Several Guinea-Worms..	From Hingoli	Dr. Mallins.
1 Tailor Bird's nest.....	.....	Mr. J. O'Connell.
1 Chameleon (alive).....	Chameleo vulgaris	Mr. M. B. Kolah.

Contributions to the Library.

Journal of Comparative Medicine and Surgery, Vol. X., No. L. 3, in exchange.

Fauna of British India—Fishes, Vol. I. (Day), presented by the author.

Notes on the Indian Chiroptera (Blandford), presented by the author.

Transactions of the Royal Dublin Society, Vol. IV., Parts 2 to 5, in exchange.

Proceedings of the Royal Dublin Society, Vol. III., Parts 3 to 6, in exchange.

Exhibits.

Captain Herbert, A. D. C., exhibited a curiously deformed tooth of a wild boar.

The following papers were then read :—

Notes on Man Eating Tigers, by Mr. Reg. Gilbert.

Two curious instances of mimicry, by Mr. W. E. Hart. Both papers appeared in Part 3, Vol. IV., of the Society's Journal.

Proceedings of the October Meeting.

The usual monthly meeting of the members of this Society took place on Tuesday, the 1st October, and was largely attended. The Hon. Mr. Justice Hart presided.

The following new members were elected :—Mr. G. F. Horbury, Colonel F. H. Jackson, Mr. D. Gostling, Mr. W. H. Wolff, C.E., Mr. T. F. W. Wood, Dr. C. Mallins, Mrs. Blathwayt, Mr. T. A. Bland, Mr. J. F. Duthie, Mr. W. C. Hughes, Mr. W. Harvey, C.S., Mr. A. M. Gubbay, Mr. J. R. Chico, Captain F. G. Alexander, and Mr. C. J. Dalby.

Mr. E. M. Slater, the Honorary Treasurer, then acknowledged the following contributions to the Society's Museum :—

CONTRIBUTIONS DURING SEPTEMBER.

Contribution.	Description.	Contributor.
1 Snake	Trimeresurus trigonocephalus.	Mr. E. H. Aitken.
1 Bear (alive)	Ursus labiatus	Dr. Herbert.
A quantity of Snakes and Insects.	From Travancore	Mr. W. Mahon Daly.
1 Tree-shrew	Tupaia elliotti	Do.
1 Butterfly	Hestia haydeni (from Upper Burmah).	Mr. C. F. Gilbert.
1 Snake (alive)	Lycodon aulicus (from Dhond).	Anonymous.
A quantity of Locusts	From Ahmedabad District	Mr. H. E. M. James, C.S.
1 Panther's Skull	Felis pardus	Capt. F. J. Winter.
1 Oyster Catcher	Hœmatopus ostralegus	Mr. W. F. Sinclair, C.S.
2 Snakes	Daboia elegans and Ptyas mucosus.	Mr. C. E. Kane.
1 Krait (Albino)	Bungarus arctuatus	Mr. L. H. Butcher.
2 Snakes	Silybura macrolepis	Do.
1 Chameleon (alive)	Chameleo vulgaris	Do.
1 Trap-door Spiders' Nest.	From Igatpuri	Do.
Several Guinea Worms (alive).	Dracunculas sp.	Dr. C. Mallins.
1 Golden Plover	Charadrius fulvus	Mr. W. W. Squire.
1 Little Stint	Tringa minuta	Do.
2 Small Terns	From Kennery Lighthouse.	Do.
Several large Moths	From Almora, N.-W. P.	Miss Brooke.
1 Nest of Common Honey-sucker.	Do.	Do.
1 Snake	Gongylophis conicus	Mr. R. A. Willis.
1 Large Krait	Bungarus arctuatus	Mr. P. Morris.
2 Snakes	Zamenis diadema and Dipsas gokool.	Colonel Hore.
A quantity of Marine Shells, Fishes, &c.	From Alibag	Mr. W. F. Sinclair, C.S.
2 Bar-tailed Godwits	Limosa laponica (from Alibag).	Mr. W. F. Sinclair, C.S.
1 Blackbird, alive (Albino).	From Japan	Capt. Nantes.
1 Octopus	Do.	Do.

MINOR CONTRIBUTIONS.

From Mr. W. F. Hamilton; Mr. Kaikobad C. D. Adenwalla; Mr. E. H. Elsworthy; Mr. W. F. Sinclair, C.S.; and Mr. J. R. Chico.

CONTRIBUTIONS TO THE LIBRARY.	Presented by
Bulletin de la Société Zoologique de France, 1889	In exchange.
List of the Lepidopterous Insects collected in Cachar by Mr. Wood-Mason, Part II. "Rhopalocera," by J. Wood-Mason and L. De Nicéville.	The Authors.
Records of the Geological Survey of India, Vol. XXII., Part 3	In exchange.
Manual of New Zealand Coleoptera	Do.
Proceedings of the Royal Society of Victoria, Vol. I.	Do.

PRESENT TO THE BRITISH MUSEUM.

The Honorary Treasurer stated that the committee had received a letter from Dr. Gunther, of the British Museum, acknowledging safe receipt of the skeleton, skin,

stomach, and fœtus of a *Neomeris kurrachiensis*, sent to him by the Bombay Natural History Society, and adding that the specimen would be of the greatest use to Mr. Flower in his forthcoming paper on this genus of dolphins.

Mr. J. D. Inverarity then read a very interesting paper on "The Indian Bison with some Notes on Stalking him," which appears in another part of this number.

Proceedings of the Meeting of 12th November 1889.

The usual monthly meeting of the members of this Society took place on Tuesday, the 12th November, Dr. Maconachie presiding.

The following new members were elected:—Mr. Eduljee Dinshaw, Mr C. G. Dodgson, C.S., Mr. H. W. Keys, Surgeon-Major J. Scully, Mr. E. M. Ewart, Mr. L. G. Prickett, Mrs. C. C. James, Mr. W. S. McClelland, Colonel W. S. Hore, Mr. A. P. Young, Surgeon L. F. Childe, Mr. J. C. Jones, Captain the Hon. R. T. Lawley, Mr. Aga Shaikh Mahomed, Mr. E. G. Williams, Mr. H. C. V. Hunter, Mr. C. A. V. Davies, Mr. P. Thompson, H. H. Prince Baldevjee of Dharampore, Mr. A. F. Cox, M.C.S., Mr. G. H. R. Hart, Mr. A. R. Bonus, C.S., and Mr. Isaac Benjamin.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's collections, *viz.*:—

Contributions during October.

Contribution.	Description.	Contributor.
A quantity of Fishes, Crabs, &c.	From Aden	Capt. Shopland.
1 Snake	Tropidonotus quincuntiatus.	Mr. C. E. Kane.
1 Snake	Trimeresurus sp.	Mr. E. H. Aitken.
1 Oryx (alive)	From Berbera	Mrs. Ashby.
1 Loris (alive)	Loris gracilis	Mr. C. R. Hawkins.
2 Cobras (alive)	Naga tripudians	Mr. G. Sutton Jones.
1 Monkey Skin	Colobos guereza	Rev. G. C. Gilder.
1 Snake (alive)	Dipsas gokool	Mr. R. Maclean.
1 Snake	Callophis nigrescens	Anonymous.
A number of Botanical Specimens, mounted and classified.	From England	Mr. A. G. Pell.
1 Piece of Coral	From the Laccadive Island	Commdr. Carpenter, R.N
1 Large Kangaroo	From Melbourne	Mr. A. Gilmour.
1 Emu	From Melbourne	Mr. Frank Bailey.
2 Wallabys	From Melbourne	Mr. Frank Bailey.
A quantity of Giant Oysters.	From Bombay Harbour	Capt. Thorburn.
1 Chameleon (alive)	From Zanzibar	Miss Skinner.
Several pieces of Petrified Wood.	From Upper Burmah	Comdr. Carpenter, R.N.
1 Bison's Head	From Western Ghauts	Mr. G. K. Wasey.
115 Hymenopterous Insects.	From the Himalayas.	Mr. H. M. Phipson.
21 Dipterous Insects		
268 Lepidopterous do.		
57 Orthopterous do.		
20 Coleopterous do.		
4 Snakes		
1 Skin of Musang	Paradoxurus bondar	Mr. H. M. Hewett.
2 Pair of Chital Horns (interlocked).	From Bassim, Berar	Mr. H. A. Heath.

Contribution.	Description.	Contributor.
1 Snake	Daboia elegans.....	Mr. H. W. Barrow.
1 Indian Rock Snake	Pythen molurus	Mr. Evezard.
48 Birds' Eggs	From Kharaghora	Miss A. Dickinson.
2 Malabar Whistling Thrushes (alive).	Myiophonus horsfieldi	Mr. G. Vidal, C.S.
1 Cobra (alive)	Naga tripudians	Mr. Bulvantrao Jayaram.
1 Snake (alive).....	Cynophis malabaricus	Mr. Bulvantrao Jayaram
1 Snake (alive).....	Tropidonotus stolatus	Mr. O. Meyer.
1 Snake (alive)	Cynophis malabaricus	Dr. Kilkelly.
1 Cobra (alive)	Naga tripudians	Mr. P. R. Mehta.
A quantity of Butterflies...	From Karwar	Mr. T. R. Bell.
1 Manura (alive)	Paradoxurus musanga	Mr. Ramchundra Trimbuck.

MINOR CONTRIBUTIONS FROM.

Mr. J. W. Mayer, Mr. J. A. Betham, Miss F. Bapty, Mr. E. A. Corke, Mr. H. M. Hewett, Miss Bessie Rean, Mr. Dattatraya Bhau, and Mr. J. Janni.

CONTRIBUTIONS TO THE LIBRARY.

Fauna of British India—Fishes; by E. T. Blandford, Vol. II. (Day), presented by the author.

Report on the Kolar Goldfield; by P. Bosworth Smith, F.G.S., presented by the author.

The Indian Forester, July 1889, in exchange.

Proceedings of the Linnæan Society of New South Wales, Vol. IV., part 2, in exchange.

Memoires de la Société Zoologique de France, Vol. II., part 1, in exchange.

Bulletin and Annual Report of the American Museum of Natural History in exchange.

Annual Report of the Secretary for Mines, Victoria, in exchange.

Reports of the Mining Registrars on the Gold Fields of Victoria, in exchange.

A special vote of thanks was passed to Mr. Frank Bailey of London and Mr. A. Gilmour of Melbourne for their valuable contributions to the Society's Museum.

The Honorary Secretary drew attention to the learned paper which Mr. L. de Nicéville, of Calcutta, had written for the Society's Journal, describing a number of new and rare Indian butterflies. The paper would, he said, very shortly be published in part 3 of the Journal. The coloured lithographed plates (containing illustrations of twenty-one butterflies), which had been received from West, Newman & Co., of London, for the above paper, were greatly admired.

Amongst the contributions above acknowledged was a pair of chetul's horns, received from Mr. H. A. Heath, of Bassim, Berars, which excited much interest. The stags, while fighting, had in some extraordinary manner so interlocked their antlers that they had found it impossible to separate them, and consequently must have died from starvation, or have been eaten by wild beasts.

Mr. W. F. Sinclair, C.S., then read a short paper, entitled "Down the Coast," describing, in a very clear and interesting manner, the character of the scenery on the sea coast, south of Bombay, between Alibag and Janjira. The lecturer gave a lively account of the principal objects of Natural History likely to be met with during the trip, and illustrated his remarks with various specimens of birds, fish, &c., from the Society's collections.